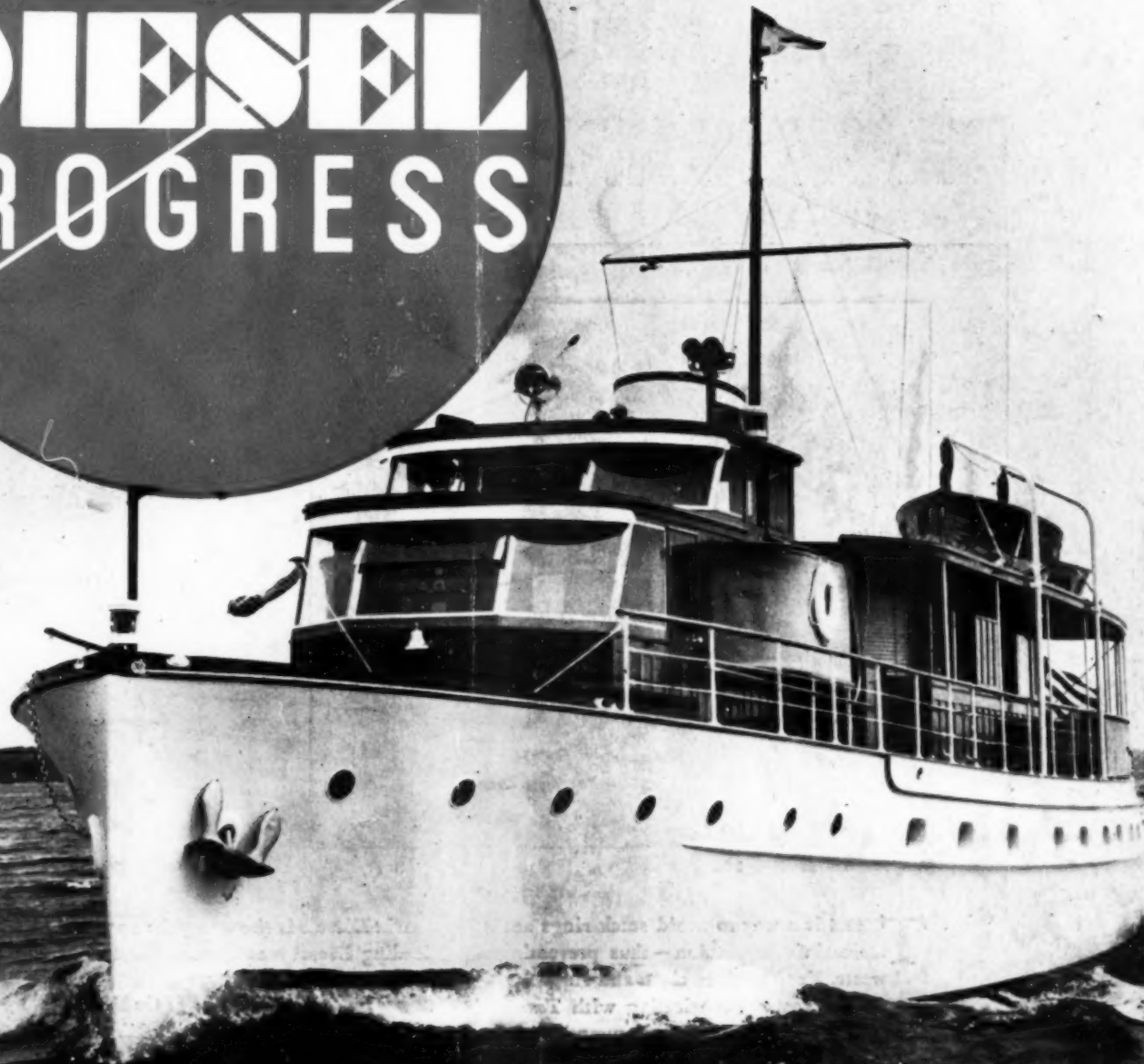


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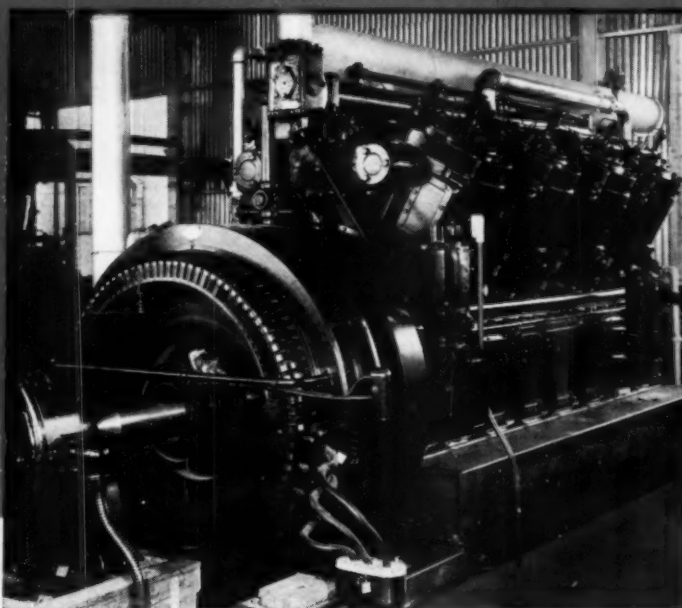


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AUGUST 1948

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FRONT COVER ILLUSTRATION: "Seaplay," 80-foot luxury houseboat built by the Trumpy yard at Annapolis for George W. Codrington, veteran yachtsman of Cleveland, Ohio. She cruises at 12 knots with a pair of General Motors diesels, rated 200 hp. each, and will fly the burgees of the New York and Larchmont Yacht Clubs.

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Seaplay

80-foot houseboat cruiser

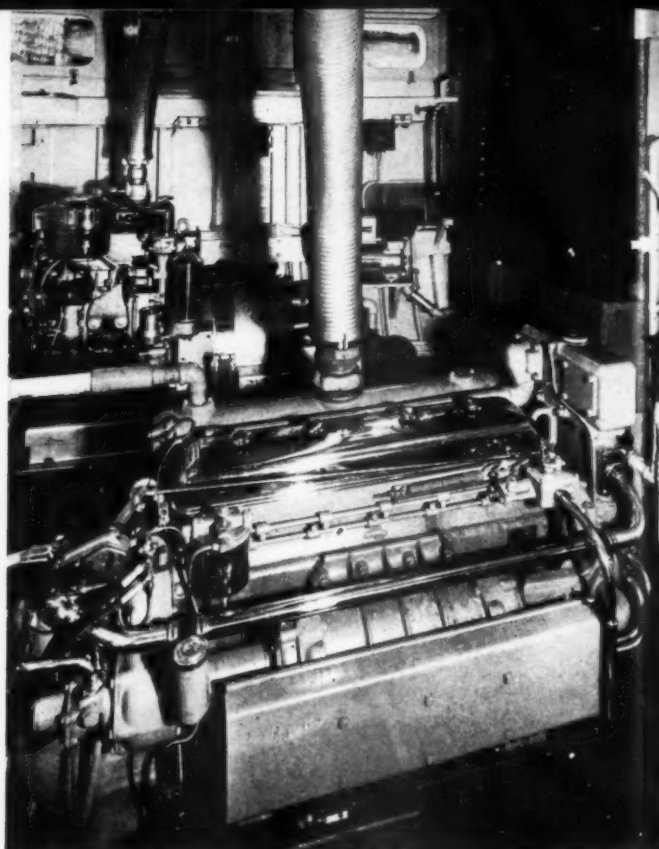


The 80-foot Seaplay, owned by George W. Codrington—one of the largest of the 1948 fleet.

EVERYONE has heard that particularly expressive two-note whistle which G.I.'s used during the war when something particularly attractive and shapely came into view. This is exactly the whistle your reporter involuntarily gave when he first stepped aboard George W. Codrington's new houseboat yacht, "Seaplay" at Daytona Beach, Florida—for she is a thing of beauty and a joy forever.

But mere size does not make a yacht ideal—she has to embody a combination of all the elements

of skills of the naval architect; the builder and the machinery manufacturer. Seaworthiness, sleek lines, good turn of speed, ease of handling, sturdiness, compactness with comfort, reliability, and ability to go anywhere her owner desires must enter into her design and construction. She must have the maximum of accommodation and equipment for her over all dimensions, and every cubic inch of space must serve a functional purpose. and, all these features must be adapted to the owner's special ideas and requirements. The "Sea-



Engine room of the Seaplay with two 200 hp. General Motors diesels installed.

play" is distinctive in that she meets all these tough specifications. She is different in many ways from the average houseboat cruiser in that common sense is an important part of her entire design.

Mr. Codrington happens to know what constitutes a really good boat. He spends many of his business hours aboard commercial and pleasure vessels, and also is a successful work boat builder in his own right. To his own extensive and practical sea-going experience Mr. Codrington

Afterdeck lounge of new Trumpy-built yacht.



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ton has added that of an old-time yacht builder—John Trumpy of Annapolis—who built the "Seaplay," with the result that he now has a craft which is commanding exceptional attention in every yacht club harbor visited.

The "Seaplay" is mighty commodious for her size, which is 80-feet over all, 78-feet on the waterline with a beam of 18-feet. Her normal cruising draft with fuel, water, stores, passengers and crew is 5-feet, so she can traverse comparatively shallow inland waterways, or be perfectly safe in open water during a blow. Her ordinary cruising speed is 12 knots, but she has a top speed of 13.4 knots, which is ample for the purpose of an owner who would like to relax and take things leisurely whenever possible. On a faster yacht one would lose that desirable atmosphere of graceful rest.

Construction of the yacht is grade 100 A-1, with heavy members and framing of white oak, and long-leaf yellow pine planking fastened with bronze screws. The deck, deckhouse and trim are of teak, and two watertight bulkheads divide the hull into three sections.

One of the first features of the design to catch the eye is the unusual layout of the pilot house, this being partly lifted over the deckhouse with a dropped floor and stepped back about 9-feet from the forward end. Not only does this streamlined arrangement give the navigator an unobstructed view ahead, but it enables the owner to have his favorite "above deck" room given a similarly unobstructed view, without the same being blocked by the usual pilot house.

This particular compartment is an observation room deluxe, but used by the owner as his office when his pleasure hours are interrupted by important business communications coming over the ship-to-shore telephone.

We have mentioned that the pilot house has a dropped floor. This arrangement prevents the superstructure being top heavy in appearance and adds to the graceful lines of the hull, at the same time reducing wind resistance. The space between

the deck and the pilot house and the main deck is used for storage and for the cooking gas tank, while a part of it gives extra headroom to the galley below. This is just one example of the great care taken to create and utilize space. The bridge wings on either side of the pilot house are a feature new to yachts, and enhance the appearance as well as adding utility. The main engines are controlled from the pilot house by means of control mechanism, providing the captain with instant response from the propellers without signaling below.

Aft of the stowage space is the pantry, a toilet and stairway down to the galley. Next aft in the deckhouse is the owner's combination living room and dining saloon, a spacious compartment some 23-feet long, tastefully decorated and comfortably furnished with deep armchairs and settees upholstered in soft color tones with heavy pile rug to blend. There also is a dining table, three buffets, and floor lamps. As consistent with a houseboat type of yacht this room has large windows.

The after deck also is very comfortable and roomy, with a wide upholstered seat across the stern, and adequately furnished with wicker arm chairs and table. Windbreak doors are built in the after deck corners, providing protection during cool or inclement weather conditions.

A companionway in the dining room leads below to the owner's and guests' quarters. The owner's double stateroom aft is 11-feet by 16-feet with connecting bathroom and electrically operated toilet at its forward end to the starboard of the entrance passage. There are two beds, one on either side of the room: a large dressing bureau and two wardrobes. The portlights in this and other cabins are of special Trumpy rectangular design and slide fore and aft to open and close. They are fitted with blinds in back of the side panels.

On the port side of the passage leading to the owner's stateroom there is another bathroom which services the guests' accommodations. On

the starboard side of the hull is the larger of the guests' two staterooms, this one having two beds, while the other guests' room is on the port side and has one bed with a Pullman berth above. Both cabins have large wardrobes, bureaus and chests of drawers, and are most attractively furnished. Everything has been arranged in these staterooms to give the guests the utmost of free space, so adding to their comfort when they wish to remain in their own quarters.

A watertight bulkhead separates the guests' quarters from the engine room, and on the other side of this wall the fuel tanks have been placed, so tending to muffle any noise from the engines when cruising. In the machinery compartment are installed two General Motors Model 6-71, six-cylinder diesel engines of 200 b.hp. each at 2,000 r.p.m., driving twin propellers through a hydraulic clutch and reduction gears. At 12-knot cruising speed the consumption of fuel is exactly one gallon per nautical mile covered by the yacht. As the three fuel tanks hold a total of 900 gal., the cruising range is 900 nautical miles.

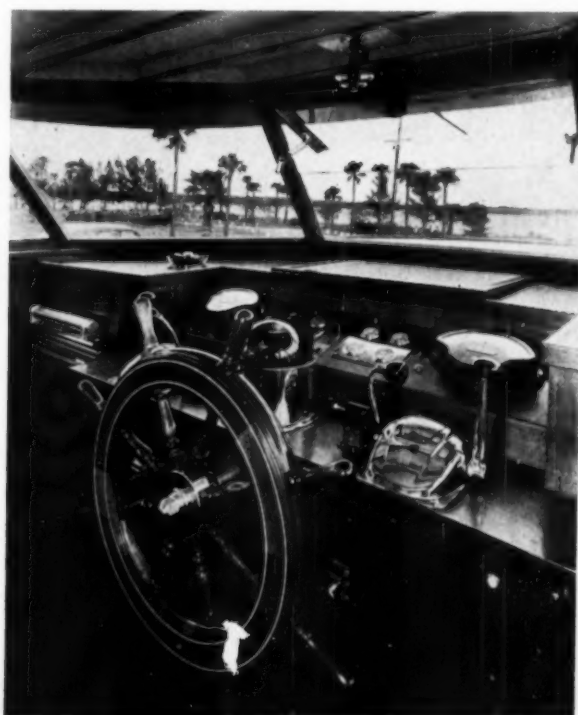
For auxiliary power and for starting the main engines there is a 10-kw. General Motors diesel generator set and an Exide storage battery of 217 ampere hours capacity. The domestic service water pump is driven by electric motor off the battery, making for silence when the yacht is anchored or moored. Electric light also is taken off the battery. Generally speaking the layout of the engine room is extremely simple, so its dimensions of 11-feet by 18-feet give ample working room. However, everything is so automatic that cruising is normally done without anyone in the engine room.

The galley forward of the engine room is quite large for an 80-footer, being 6-feet 6-inches by 17-feet, and is fitted with butane gas range, deep freeze, and refrigerator. The heating boiler for the domestic water supply, and boiler for hot water heating of the yacht, are both located in the galley.

Main cabin of Codrington yacht is comfortably furnished.



Pilot house shows Adel Iso-Draulic engine controls and Weston tachometers.



DIESELS FOR ROTARY RIGS IN DEEP DRILLING*

This article describes diesel drilling engines and their application to large rotary rigs for drilling the increasing number of deep wells required by the global search for petroleum to supply the expanding needs of the peoples of the world.

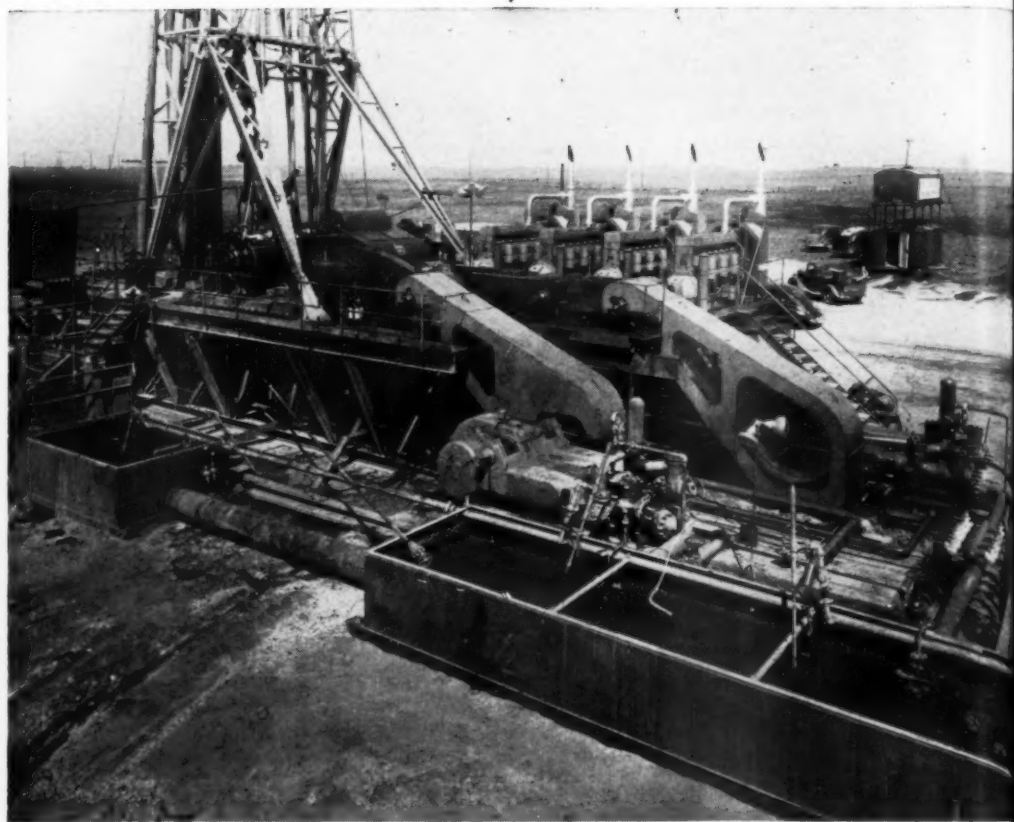
PERHAPS the reader will be interested in an attempt to explain briefly why there is a world-wide search for petroleum. In the United States the current annual consumption is estimated to be very nearly 600 gallons per capita. With not over six or seven percent of the world population and land area, the United States at present produces and consumes nearly two-thirds of the world output of petroleum. Consumption has increased approximately 35 percent since last pre-war year 1941, and it has been predicted that it will continue to increase for years to come, perhaps being one-third greater in 1956.

The foregoing explains why there is great drilling activity in continental United States where more than 2,000 rotary drilling rigs were estimated to be active as of January 1. An even larger number would be in service but for the acute shortage of steel, of which a large tonnage is required for well casing and flow tubing as well as for drill pipe. In spite of handicaps a total of more than 33,000 wells were drilled in 1947, and possibly as many as 36,000 wells may be drilled in 1948 if the steel is made available.

Exploratory drilling is proceeding on a large scale, and the new Benedum field in West Texas with its 12,000-foot discovery well is one of the more spectacular recent results. In the exploration of the Continental Shelf in the Gulf of Mexico a recent 13,000-foot well is 18 miles off-shore, and a well now drilling is 25 miles out. Wildcat drilling in almost every part of the Union shows the persistent effort made to find new oil-producing areas.

Outside of the United States practically the whole increase in petroleum supply since 1940 comes from Venezuela and the Middle East; petroleum production in the rest of the world, taken as a whole, (but excluding the United States, Venezuela and the Middle East) being less than prewar. The annual consumption per capita as an average for the whole Eastern Hemisphere (excluding Russia,) has been estimated roughly as being only about three percent of the current per capita consumption in the United States. Regardless of any allowance which may be thought desirable for possible error in such estimate, the sharp contrast between per capita consumption in the United States and per capita consumption in the Eastern Hemisphere is startling. The de-

* Prepared by Superior Engine Division, National Supply Co.



Drawworks, and diesel powered rig drive of a large portable rotary rig.

mand greatly exceeds the available supply, and there is an acute oil shortage in the Eastern Hemisphere.

Time will be required to restore and greatly expand the urgently-needed oil producing, refining and transportation capacity depleted by the late war and its aftermath in various areas of Europe and Asia; also to discover and develop new petroleum reserves. But on the assumption that reconstruction and stabilization of Europe and Asia will occur, Joseph E. Pogue has predicted that oil production and consumption outside of the United States will increase perhaps 76 percent during the decade ending in 1956. This 76-percent-increase for the rest of the world is to be compared with the 37-percent-increase tentatively predicted for the United States for the same period.

As a result of the interest awakened by this world-wide demand, exploration is going on in practically every area where geological conditions are favorable. Merely a summary review of active oil exploration and drilling arranged alphabetically by country would occupy more space than this article. American-built rotary drilling rigs are now operating or are planned to be

operating in many of the places where oil is being sought, such as the Bahamas, Cuba, nearly every country of Central and South America, southern France, Morocco, Egypt, Ethiopia, Arabia, Burma, East Indies, Philippines, Australia and others. American machinery, drillers and technique are going overseas to increase the world supply of petroleum. In Canada the important discovery of the new Leduc field near Edmonton has stimulated greater drilling activity in the prairie provinces. Exploration in Ontario and in the maritime provinces is continuing. In Alaska wells are being drilled in the U. S. Naval Reserve south of Point Barrow, and the possibility of other exploratory drilling is mentioned. Mexico is reported to be planning renewed drilling and exploration, which was interrupted by the revolution and the expropriation of the oil properties. Russia has very large oil reserves, and future discoveries in the vast expanse of territory in the U.S.S.R., in Europe and Asia reasonably may be expected to increase enormously the world's reserves of petroleum. For the present we can only infer that behind the "Iron Curtain" the rate of development is relatively slow; partly because of limited equipment and shortages of essential material, for some of which the United States and western Europe were prewar sources.

The sedimentary thickness of the shallower strata must be drilled no longer reported is 20,000 feet past and also an increasing powerful and Since an es in the Unite is every inc employ the ainable.

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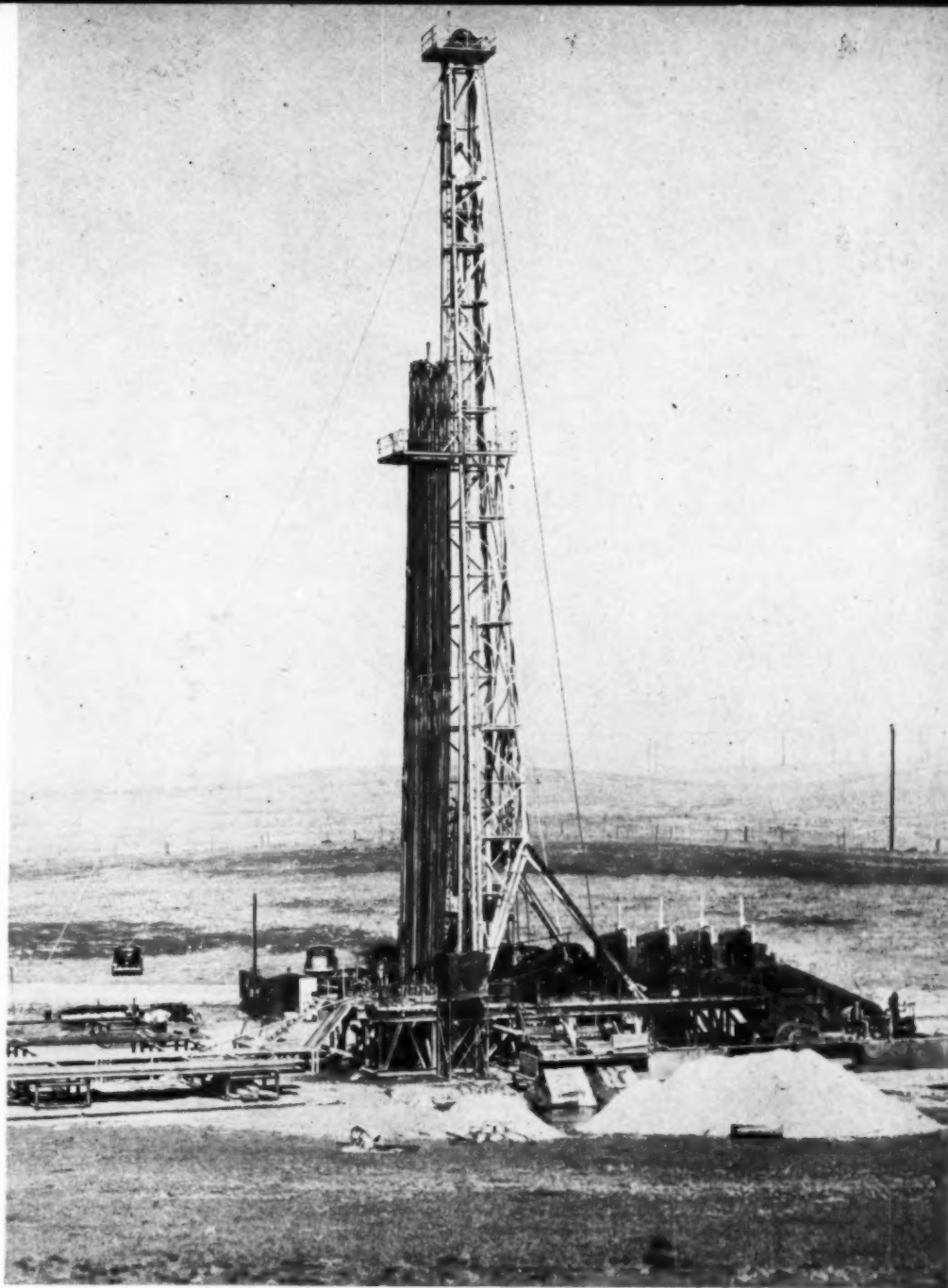
The sedimentary stratified rocks which are possible reservoirs of petroleum have in some areas a thickness of many thousand feet. Not only the shallower strata must be explored but the deeper sedimentary rocks which may possibly contain oil must be drilled. Wells of 10,000 and 12,000 feet no longer excite special remark. Wells have been drilled below 17,000 feet. The greatest depth yet reported is 17,823 feet. There is discussion of wells 20,000 feet deep. Deeper drilling than in the past and also many more deep wells have created an increasing demand for drilling rigs sufficiently powerful and suitably equipped to drill deep wells. Since an estimated 80 percent of new oil wells in the United States are drilled on contract, there is every incentive for the drilling contractor to employ the most efficient drilling equipment obtainable.

The modern rotary drilling rig is the result of the persistent effort of a large number of engineers, technicians in many fields, designers and operators during nearly a half century since the first approximation of present rotary drilling technique came into important use to drill oil wells. The diesel mechanical-drive rotary rig has come into general use because of its adaptability to practically all conditions, moderate unit weights to be moved, relative simplicity, reliability, in addition to low operating and maintenance costs.

The diesel engine consumes less fuel than any other prime mover. Water consumption of the diesel is very small. Except for starting air and storage for fuel oil, the diesel is a self-contained power unit, being complete in itself. Unit weights and total weight per rig are moderate; large power is available with relatively light weight. The diesel has a wide speed range, quick response to throttle control and fast acceleration. Diesels are drilling oil wells in every zone from the Tropics to the Arctic, under the most varied conditions.

Not only may climatic and other conditions be difficult, but drilling operations often must be carried on in comparatively inaccessible localities. Transportation may be so acute a problem that its low fuel consumption and the very small water requirements will make the diesel the only kind of power which can be considered.

It is generally accepted that a large fraction of the actual horsepower hours consumed in drilling a well are applied to the mud pump or pumps, which is a continuous load for as long as circulation of the mud fluid is maintained. Usually, however, the peak power requirement is intermittent, for hoisting the drill pipe to change the bit. This operation consists of a succession of short lifts in a cycle of perhaps one to two minutes, repeated on a deep well for some hours before the new bit reaches the bottom and drilling can be resumed. For a fraction of a minute all available power may be used to accelerate the lift. Then, while a section of drill pipe is being removed, the engine RPM drops to idling speed. Almost immediately thereafter the engines are again operated at top torque and fastest rate of acceleration during the seconds of the next hoisting period.



Diesel powered rotary rig with 136-foot cantilever mast with drill pipe stacked.

It may be of interest to refer to published discussion of possible future hoisting conditions for drilling very deep wells up to 20,000 feet. It is stated that the static weight of the string of drill pipe may approach 400,000 pounds and that the derrick should be high enough to handle the drill pipe in 135-foot sections. It is also estimated that static weight of casing string may exceed 800,000 pounds.

The maximum horsepower which can safely be applied to rotate the drill pipe is so moderate that when the rig power plant is inadequate for other operations, it will usually be found unnecessary to give special consideration to engine capacity to drive the rotary table.

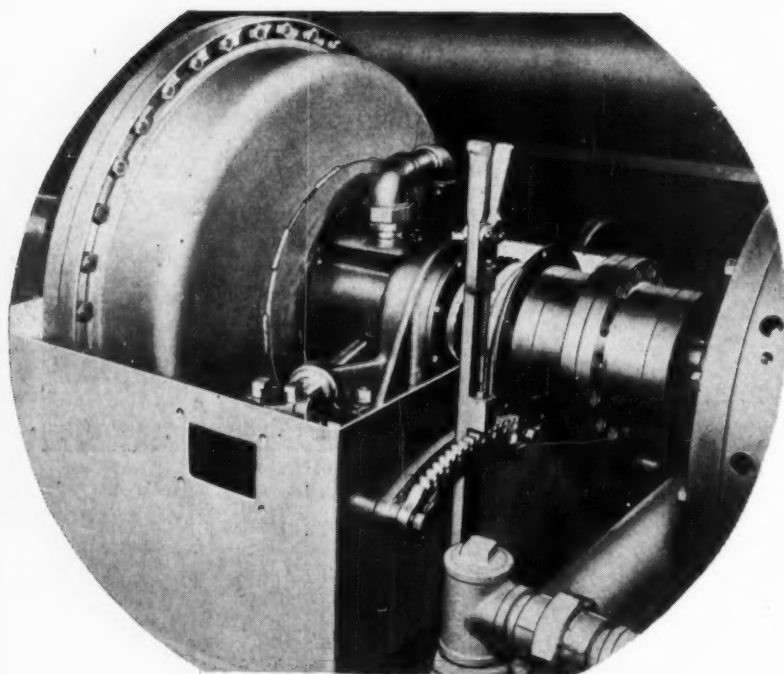
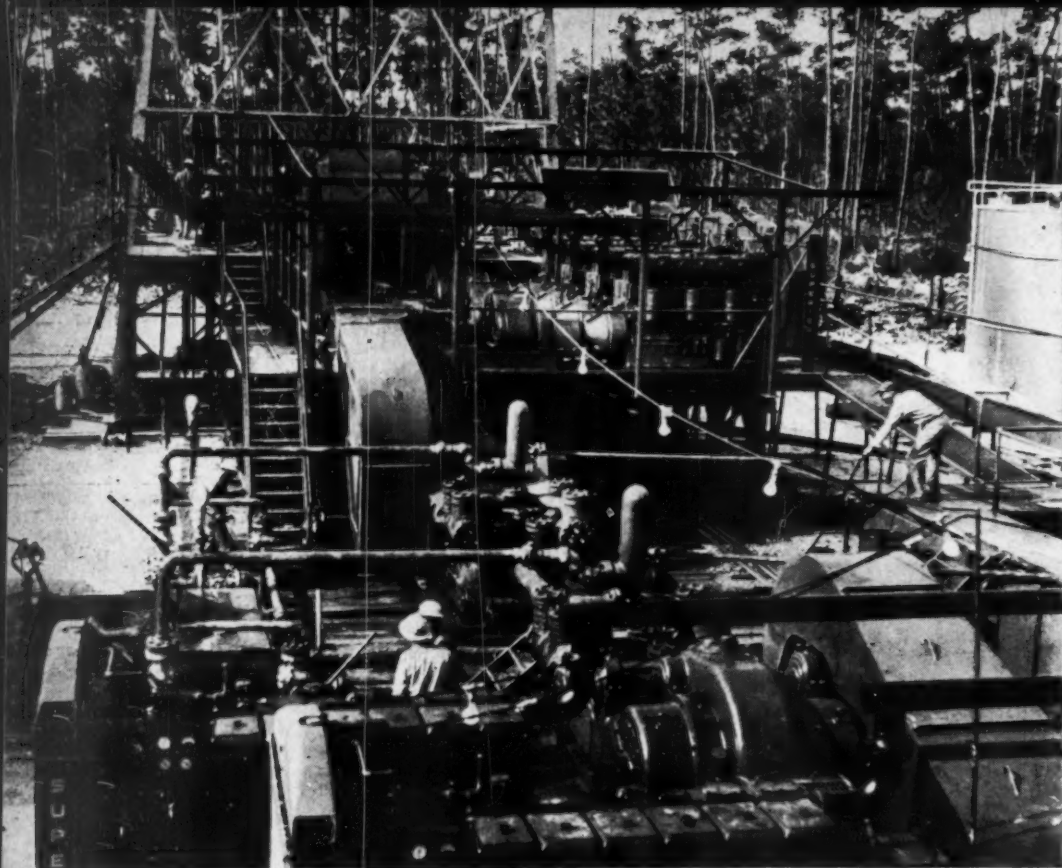
Usually on the larger mechanical-drive rigs there are three or four diesels behind the drawworks depending on: (a) the horsepower capacity of engine selected; (b) the capacity of the rig; (c) the depth of the well to be drilled.

The engines are coupled to a chain transmission which transmits their combined power, i.e., the engines are compounded. (Compounded is the term commonly used in the United States, but technically the engines are "paralleled.") There are means for de-clutching any engine from the others. One or two of the engines may drive the pump or pumps, while another engine can be operated separately to rotate the drill pipe. Usually the combined power of all the engines is utilized for the hoisting operation. Engine speed is at all times controlled from the derrick floor by the driller. On some present-day rigs the clutches on the various rig drives can be controlled by the driller, also any engine can be clutched or de-clutched from the driller's position. The use of air-actuated clutches and hydraulic couplings facilitates derrick control.

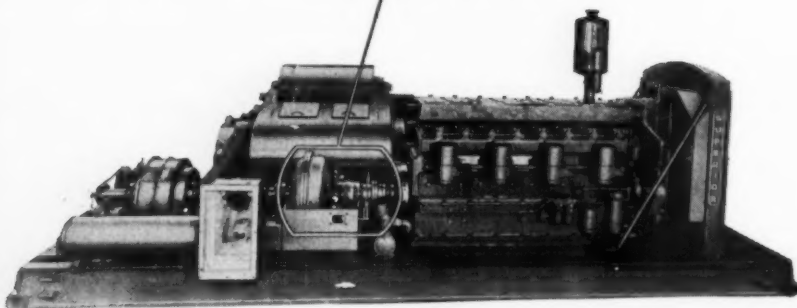
The first use of hydraulic couplings on a rotary drilling rig dates back perhaps a dozen years. Based on experience through the years, the latest

powered rig drive
rotary rig.

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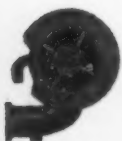


↑
Six diesels are used to power this exploratory drilling rig operating on deep tests in a Latin American country.



←
Gyrol fluid drive on one section of a 3-engine sectional drive.

↓
Helixhaust manifold for 8-cylinder supercharged diesel.



design of diesel mechanical-drive rig employs a compact hydraulic coupling which is located adjacent to the engine power take-off. The simplified coupling assembly is without contact or wear on moving parts other than roller bearings and seals. A sliding scoop control mechanism speeds of filling or emptying of the coupling, which when empty of oil cannot transmit torque or power. The sliding-scoop control mechanism is operated manually; or optionally, can be arranged to be actuated by air control from driller's position. The hydraulic coupling serves as a cut-off clutch between engine and rig transmission shaft. Any other clutch on engine is dispensed with.

Hydraulic couplings provide a cushion between the engines and driven machinery to reduce shock loading of rig clutches, pumps, hoisting equipment and string of drill pipe, and will not transmit harmful torsional vibrations.

The Gyrol fluid drive makes use of the most efficient type of hydraulic transmission. With suitable adjustment of fluid filling and of engine speed for minimum slip, the efficiency is as high as 96 to 98 percent. The efficiency of course falls off in proportion as the slip of the coupling increases. In addition to one or two pumps powered by the rig drive, the larger rigs optionally may have additional pump or pumps, each such pump powered by an additional separate engine. The independent pump or pumps may be used for maintaining an extraordinary rate of circulation, if needed. An independent pump provides a standby unit. It may sometimes be employed as an auxiliary for mud mixing. The fluid drive makes unnecessary any other type of clutch between engine and pump.

The four-cycle, $8\frac{1}{2} \times 10\frac{1}{2}$ inch, six and eight-cylinder Superior diesel engines shown in accompanying illustrations are the result of development through years of experience with the exacting and varied requirements of rotary drilling. These engines are operating on drilling rigs in every important oil-producing area in the world. Usable power for hoisting is conservatively rated at 345-BHP, 460-BHP and 700-BHP for the respective models. With radiator cooling the power taken by fan driven from engine must be deducted from these ratings as ascertain the available horsepower.

Available Horsepower (with Radiator Cooling) at 900 RPM

	Naturally Aspirated	Naturally Aspirated	Super-charged
Number of cylinders	6	8	8
BHP for slush pump	280	375	620
BHP for hoisting	325	435	670

These diesel drilling engines are ruggedly constructed. They are completely enclosed, oil-tight and dust-proof against sand storms. The design permits ready inspection and quick access to all parts likely to require attention for any reason other than a major overhaul. The wet-type cylinder liners are replaceable. The tri-metal precision-type main and crank pin bearing shells can be removed and replaced without any fitting.

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The camshaft can be removed within the longitudinal space occupied by the engine. The individual fuel injection pump for each cylinder is accessible by removing a light cover at operating side of engine. The fuel injector and valve rockers are accessible by removing a light cover at top. The built-in water pump, fan and their drives are of substantial durable construction with ball and roller bearings. They are all outside of crankcase and easily accessible. The operators are protected by guards around V-belt drives to water pump and fan. The built-in lubricating oil pump for the full-pressure oiling system, the edge-type and bypass-type filters and the water-cooled lubricating oil cooler are easily accessible. A rotary-type service fuel pump delivers fuel oil under pressure to the filter and to the suction manifold of the fuel injection pumps. Oil bath type intake-air filters wash the incoming air. Exhaust pyrometer, tachometer and pressure gauges for fuel oil and lubricating oil assist in operation. An alarm bell rings for failure of lubricating oil pressure or excessive temperature of cooling water.

The diesel is started by compressed air at 150 to 250 pounds, which provides a very high turning effort and great reliability as a means to rotate the engine initially for starting. Firing usually commences in the cylinder which first completes a compression stroke. Compressed air usually is furnished by a small auxiliary air compressor driven by a small engine or by electric motor. The air compressor operates intermittently to maintain pressure in the tank or tanks.

There are two governed speeds, viz., full load governed speed at 900-RPM and idling governed speed at 400-RPM, all intermediate speeds being under derrick control by the driller. Usually air control is employed. Thus the engine can be accelerated or decelerated between 400 and 900 RPM or can be operated at full governed speed, at idling speed or on the throttle at any intermediate speed as may be desired by the driller. Stop collars on the fuel pump metering racks restrict the intermittent overload which can be imposed on the engine. After the stops engage, any additional load will cause the engine to slow down in speed, thus giving warning.

The cooling system is of radiator type, sealed to prevent escape of water vapor until the pressure rises above atmosphere and temperature rises above boiling point, being of ample cooling capacity for atmospheric temperatures encountered in any oil-producing area where these engines have been used. Water consumption is small. The radiator has ten core sections, any section being replaceable without disturbing the others.

A rugged type of thermostat-actuated three-way valve by-passes the jacket cooling water around the radiator until the engine has warmed up. Since a given drilling rig and engines have been known to be moved from the tropics to sub-arctic or from temperature one to Arabia the ample cooling capacity and temperature control are important because of the wide range of climatic conditions to be met.

For the larger rigs required for deep drilling, the supercharged diesel is now available. The Buchi system of turbo-charging gives 60 percent greater power than the naturally-aspirated engine with only about 15 percent increase in weight and no increase in space. Weight per horsepower is thus reduced by about 30 percent by supercharging.

This supercharged diesel is rated 650-BHP for driving the mud pump and is conservatively rated 700-BHP for hoisting. With radiator cooling 30-HP must be deducted for power taken by fan when driven by the main engine.

Three supercharged engines can be compounded behind the drawworks to give 2000-HP for hoisting. Two of the three engines will then be available to drive pump (or pumps) during the drilling operation. Some rigs have two pumps powered by the rig drive.

Supercharging of the diesel drilling engines herein described requires: (1) a turbo-charger; (2) an exhaust manifold with multiple passages; (3) valve timing to provide for scavenging as hereafter explained; (4) oil cooling of pistons; (5) lubricating oil pump and oil cooler capacity adequate for both bearing lubrication and piston cooling.

The Buchi turbo-charger is a waste-heat gas turbine with the rotor of a centrifugal blower mounted on the turbine shaft and supported by the same bearings that carry the turbine. This type of turbo-charger has been built and used in Europe and America for years.

Part of the otherwise wasted energy of the hot exhaust gases is utilized by the turbine to generate power to drive the blower. The blower in turn supplies all the air required for scavenging and for combustion at a pressure above atmosphere. A conventional type of intake manifold connects the blower discharge to the intake valves in heads of the respective cylinders.

Supercharging increases horsepower capacity of the engine in two ways:

(1) The so-called clearance volume, i.e., space between piston crown and cylinder head, is occupied by the hot inert products of combustion at the end of the upward or exhaust stroke of the piston. In the supercharged engine the exhaust valve is held open long enough after the intake valve opens for the hot inert gases to be blown out and replaced by cool undiluted fresh air; the operation is called "scavenging." This increased quantity of new air furnishes oxygen for the combustion of a greater weight of fuel with a corresponding increase in power.

(2) Not only the clearance volume but also the entire cylinder during the intake stroke, after closure of the exhaust valve, is filled with air from the turbo-blower at a pressure somewhat above atmospheric; this increase in pressure is what is

meant by "supercharging." Since at a given temperature the weight of oxygen available for combustion is directly proportionate to the absolute pressure of the air charge in the cylinder, the weight of the fuel which can be burned and the power which can be generated are increased by supercharging.

The large gain in power of the supercharged engine results chiefly from a slightly longer period of maximum gas pressure to produce a higher average, the additional power thereby being obtained with but small increase in firing or maximum pressure. There is only a negligible increase in main bearing and connecting rod bearing maximum pressures and stresses in engine members. Little additional jacket water cooling system capacity is needed because considerable heat is carried away by the scavenging air, which blows through the cylinder and cools cylinder head, valves, piston and cylinder walls. No control equipment is necessary for the turbo-charger. The rotative speed of turbine and blower automatically rises and falls with increase or decrease in the weight and temperature of the exhaust gases from the engine. The speed of turbine and blower, therefore, varies up and down with the speed and load of engine; likewise the discharge pressure of the blower, i.e., the degree of supercharging, varies with the load on the engine and always exactly matches the load within the rated capacity of the engine.

Noteworthy is the quick response of the turbo-charger to load changes and to manipulation of engine throttle by the driller. The fast acceleration and ample power of the supercharged diesel give exceptional performance behind the draw-works when hoisting.

There is no mechanical connection between diesel engine and turbo-charger other than the supporting bracket, the manifolds for intake air and exhaust and the pipes for jacket cooling water. The oiling system for its bearings is completely self-contained with the turbo-charger.

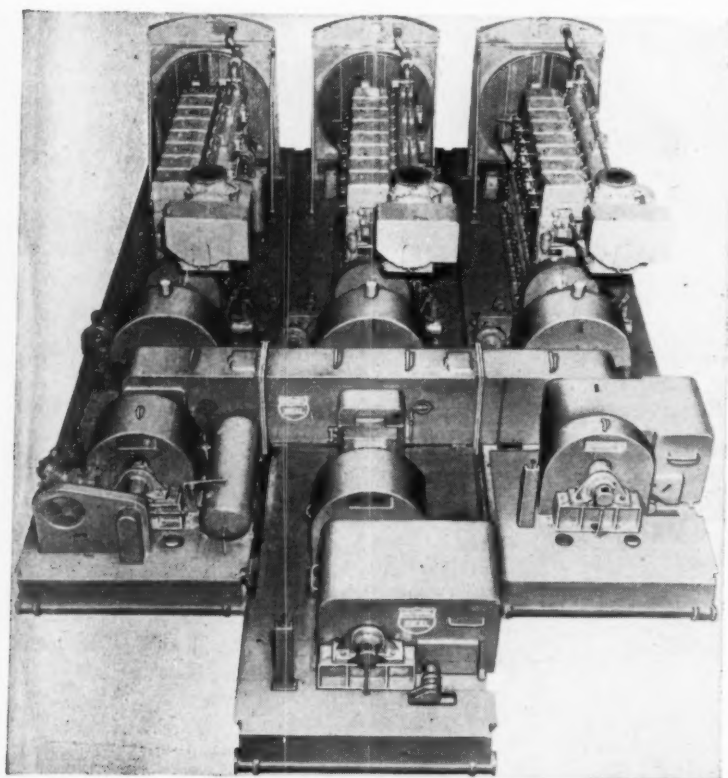
Efficient operation of the gas turbine which drives the centrifugal blower requires for an eight-cylinder engine that the exhaust manifold have four passages. Each passage conducts the exhaust gases from two cylinders to the turbine nozzle box. Thus there can be no blow-back from the exhaust of any cylinder to any other cylinder. The lengthwise partitions between the four longitudinal passages in the cylindrical exhaust manifold are welded to the longitudinal pipe which is located at the central axis of the manifold. These lengthwise partitions are twisted into helical form, thereby permitting ready connection to the same passage of two cylinders having the working cycle separated by 360° crank angle, viz., Nos. 1 and 8, 2 and 7, 3 and 6, 4 and 5 respectively. At one end the twist of the helix is right-hand, changing at mid-length of manifold to left-hand. The cylinders of each pair which exhaust into the same passage not being all adjacent, the helix is used to detour the exhaust passage in the manifold around the intervening exhaust connections from other cylinders. The exhaust manifold is water-cooled, which

minimizes fire hazard. This unique design of manifold is known as the "Helixhaust." A combined air filter and silencer is mounted on the intake of the turbo-blower.

The pistons of the supercharged diesel are cooled by oil from the engine lubrication system, circulated under pressure through the chamber underneath piston crown. Adequate cooling for the oil before recirculation is provided by the shell-and-tube type heat exchanger through which water

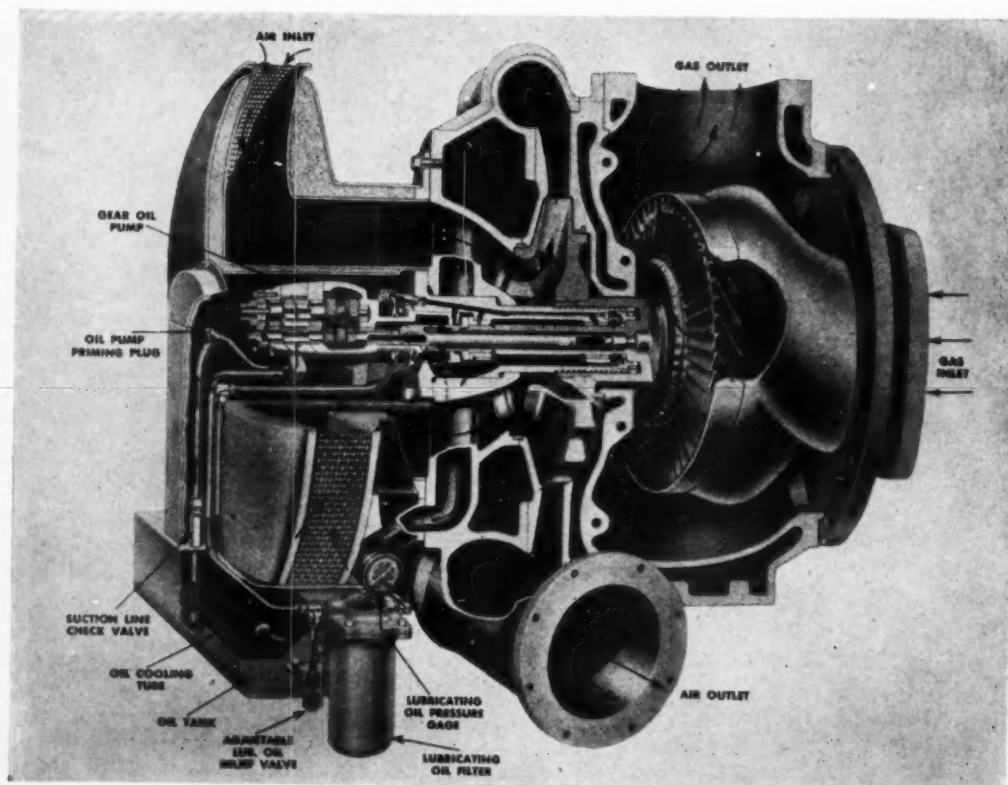
from the radiator passes before re-entering the jackets of the engine cylinders.

The low fuel consumption of the diesel is important to reduce drilling costs. Roughly the fuel oil consumed by a drilling diesel of the type herein described is about 1.5 U. S. gallons per 24-hour-day, per brake horsepower at full speed and full rated load. The economy falls off somewhat at extreme light loads and a certain amount of fuel is required even when the engine operates without load, i.e., fuel will be consumed.



←
Three-engine sectional rig drive with hydraulic transmission. Arranged two slush pumps.

↓
Sectional view of Buchi turbo-charger.



Engines are usually applied to rig on the basis of the peak horsepower required for hoisting each section of drill pipe, which peak load lasts for only a fraction of a minute. Even though the round trip may take a number of hours, the total power consumption for the series of short peaks at maximum speed, is relatively small. The drilling load (slush pump and rotary table) is usually much less than the peak load for hoisting but is a continuous load, so that the total horsepower hours consumed in drilling may be several times that for the hoisting operation. When setting casing, cementing or on a fishing job, engines may at times be idled.

From the above analysis, it will be seen that much of the engine operating hours will be at reduced speed and reduced load, so that the average load factor for the rig power plant will be low. Taking into account the loads during the various rig operations, field experience indicates that the engines behind the drawworks on a large rotary rig with 1000 installed horsepower of diesels may be loaded to about 25 or 30 percent of their full speed and full load rating, on an average of their operating time while drilling a well and on an average of various types of wells and well conditions. The load factor will vary for wells of different depths, hardness of formations, troubles of various kinds and coring. Smaller rigs may have a higher average load factor and rigs with greater installed horsepower may have a lower average load factor.

While the conditions under which a large rig may operate vary so widely that no close general estimates may be made, it has been reported that a rig with 1000 installed diesel horsepower on a very deep exploratory well has averaged 300 gallons fuel oil per day for the last 60 days, and that maximum fuel consumption on this well was 500 gallons per day when drilling at 12,000 feet with 4½-inch drill pipe. On another similar rig, when drilling an 8,000-foot well, the fuel consumption is reported to have averaged approximately 352 gallons per day or a total of 24,640 gallons for the well. With the same rig on shallower wells, under favorable conditions for the drilling operation to continue during a larger proportion of the operating time, the daily fuel oil consumption might average as high as 500 gallons or 600 gallons for the rig.

The diesel requires very little water except for a few hundred gallons sufficient for initial filling of the jackets and radiator on a given well. The subsequent loss of water while drilling, provided the sealed cooling system is kept tight, is very small. This often makes an important saving in operating costs, because in the areas of sedimentary rocks in which oil is found, the ground water and streams usually are mineralized. The streams are often muddy. In desert country water may have to be trucked a long distance, which would be costly if much water were required. The advantage of small consumption of fresh water for offshore drilling in salt water requires no explanation.

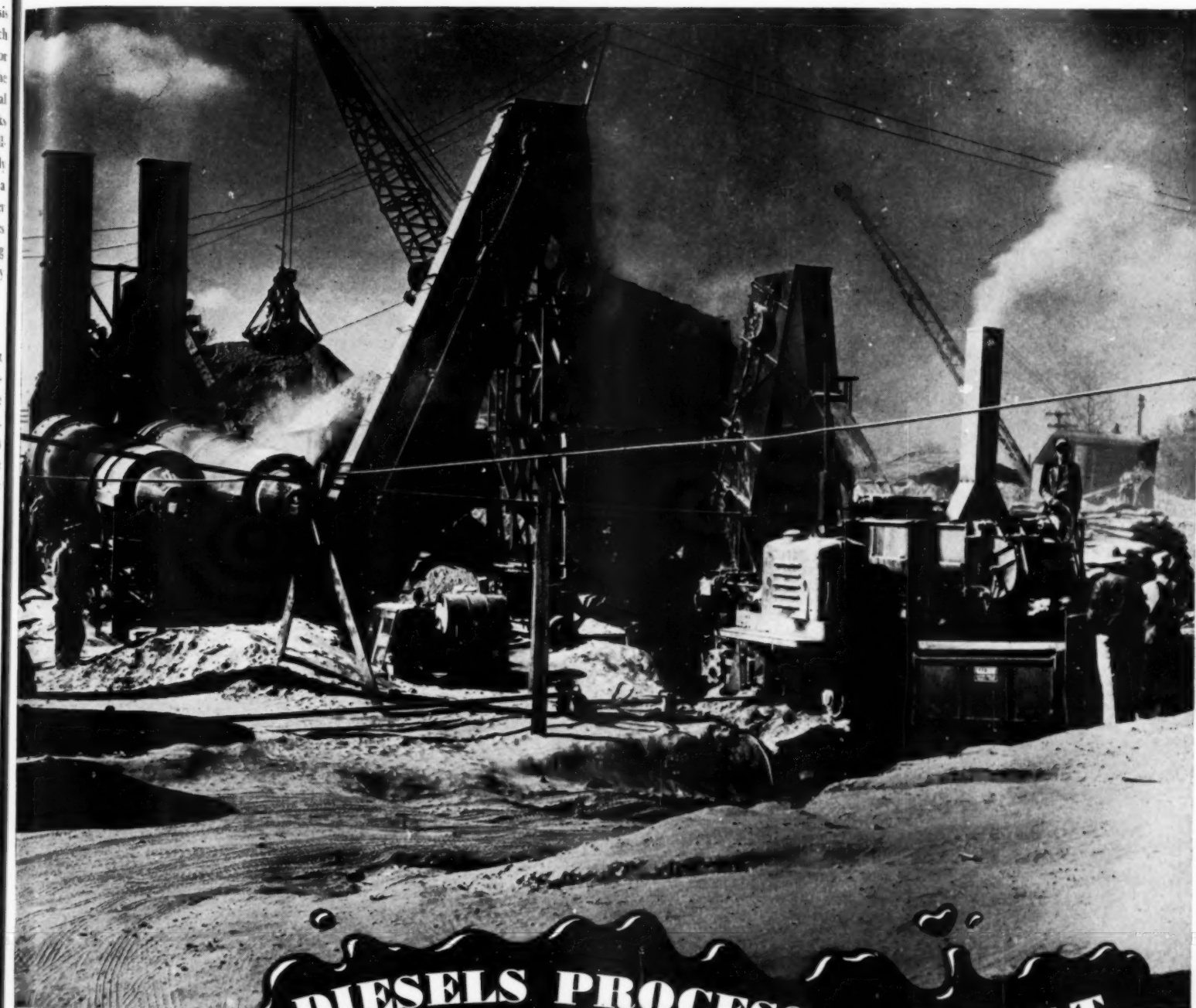
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PROGRESS



Two General Motors Diesels supply power for this Mississippi asphalt plant.

DIESELS PROCESS ASPHALT

OFFERING evidence of Mississippi's post-war progress in the development of a top notch state highway system is this new and efficient asphalt processing plant. The equipment is owned and operated by the Memphis Stone and Gravel Company of Memphis, Tennessee. Current production of the plant is being used in the relocation of State Route No. 25 between Tishomingo and Inka, a distance of about eight miles.

Driving the entire plant are two 133 hp. General Motors Diesel engines which have turned in the production record of 600 tons of black top for each day's operation. One of the engines powers the dryer, gradation unit, and two of the three elevators, while the second is connected to the mixer and the final elevator which keeps it sup-

plied. In the processing procedure sand is introduced into a hopper from which it is carried by a "cold" elevator to a double drum dryer. Here, during the drying operation, the sand is heated to temperatures ranging from 250°F. to 350°F. Mississippi State regulations provide for a project temperature variation allowance of 50° as long as the final mixture does not exceed 350° or go lower than 250°. By means of a "hot" elevator the heated material is moved from the dryer to the gradation unit where it is separated by screening into four sizes ranging from —10 to ¾ in. Gates in the gradation unit control the flow of hot sand to the mixer or pug mill so that the proper proportions of each size are introduced into the mixer with a measured amount of hot liquid asphalt. The heated asphalt supply is main-

tained in a 200 gallon tank. Lime is fed into a special hopper and feeder combination and enters the mixer cold. After the mixing process has taken place the finished product is discharged directly into 1½ ton trucks.

In spite of the tremendous amount of dust to which the engines and machinery are constantly subjected, and which is always characteristic of asphalt operations, no production time has been lost because of mechanical failures. Fuel costs on the job have been less than ten cents per ton of asphalt produced.

If Mississippi's state highway department can keep pace with the Diesels working for it, it will not have to worry about its roads.

DIESEL PIPELAYERS

**5 crawler tractors
lay 15000 feet of
20 inch pipe a day**

Doping, wrapping and laying 15,000 feet of 20-inch pipe in a ten-hour working day is a record set by Morrison Bros. Co., on a project near Kermit, Texas. A fleet of five International diesel crawler tractors, paced by a big International TD-24 did the heavy work. Operation described in sequence as follows:

Fig. 1. International diesel TD-18 supports front end of 20-inch pipe while TD-24 follows with wrapping and doping machine.

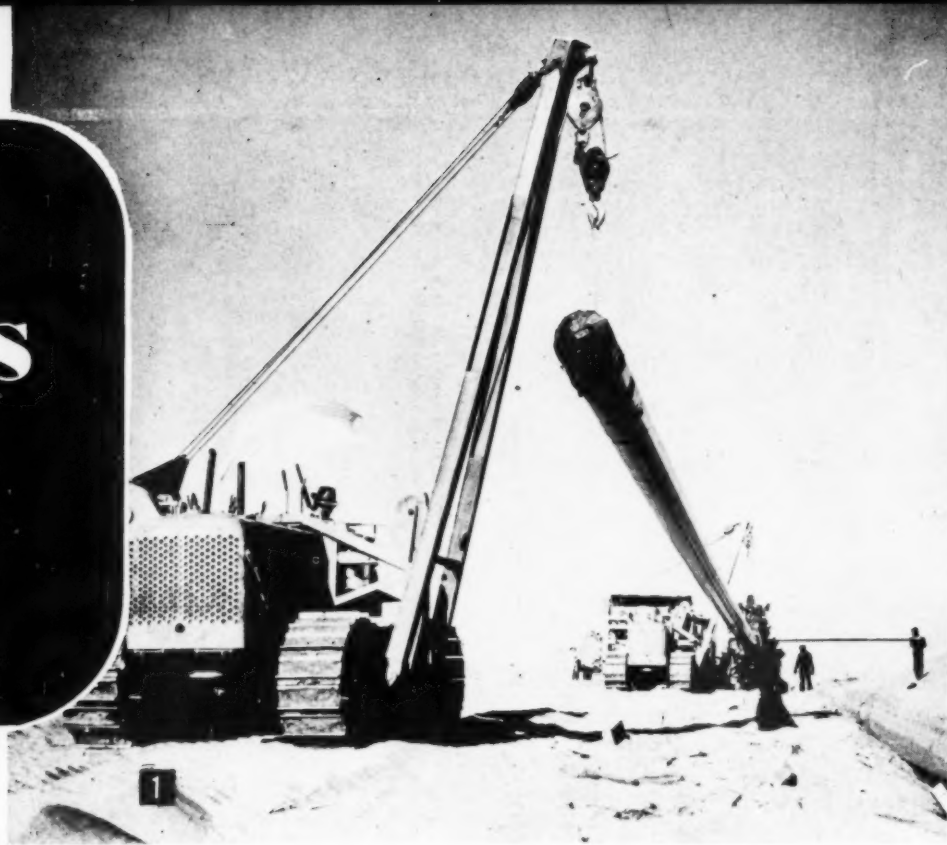


Fig. 2. Dope truck with International-powered mixer containing 3000 lbs. of dope is towed behind TD-24.

Fig. 3. Diesel tractor equipped with Superior side boom lowers section of 20-inch pipe into trench.

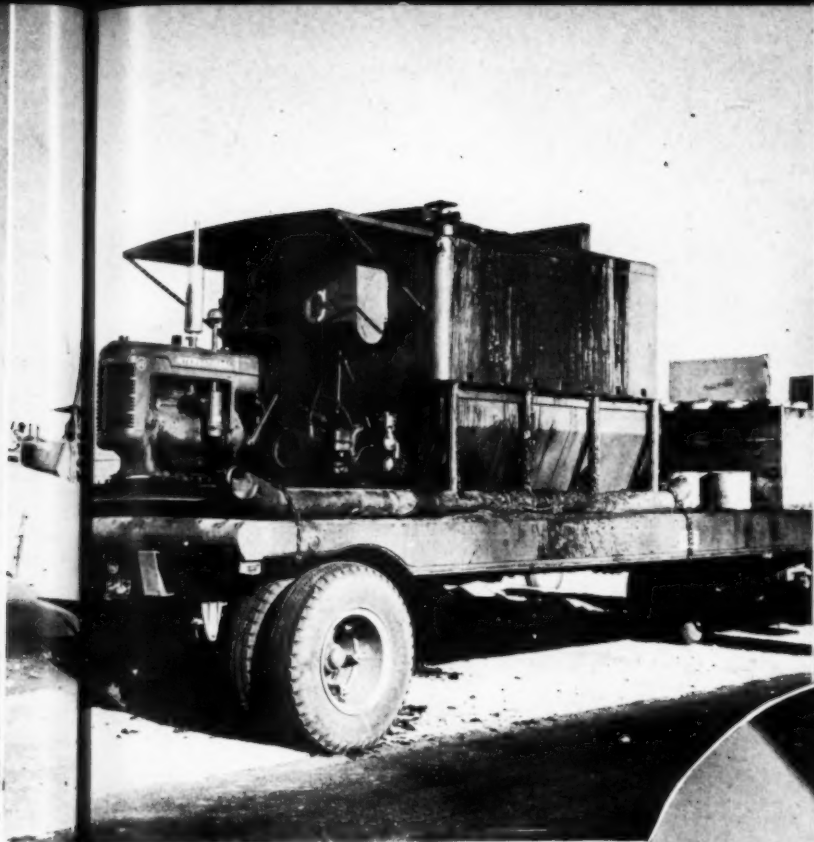
Fig. 4. TD-24 supports pipe and doping machine. Doping and wrapping process is essential for protection of pipe.

Fig. 5. Smaller diesel (left foreground) supports forward end of pipe during doping and wrapping process.



Fig. 6. Costly
terrific

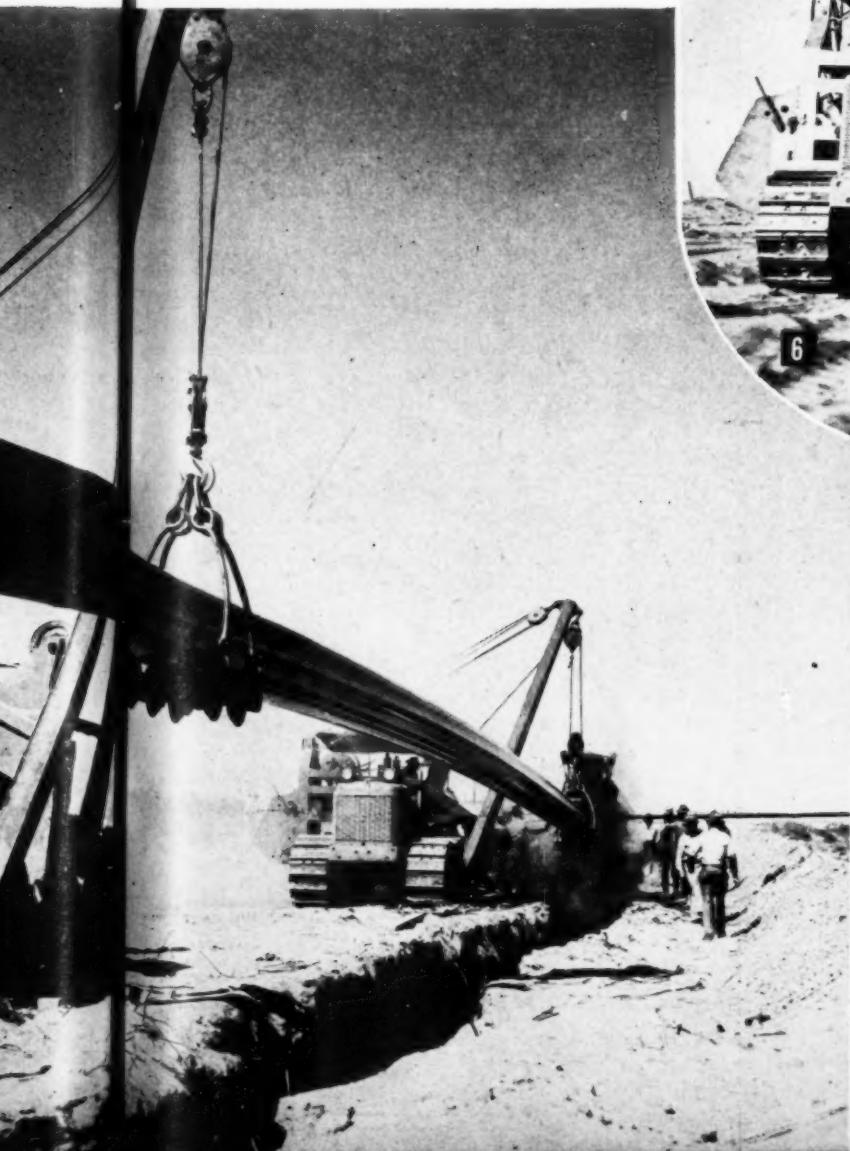
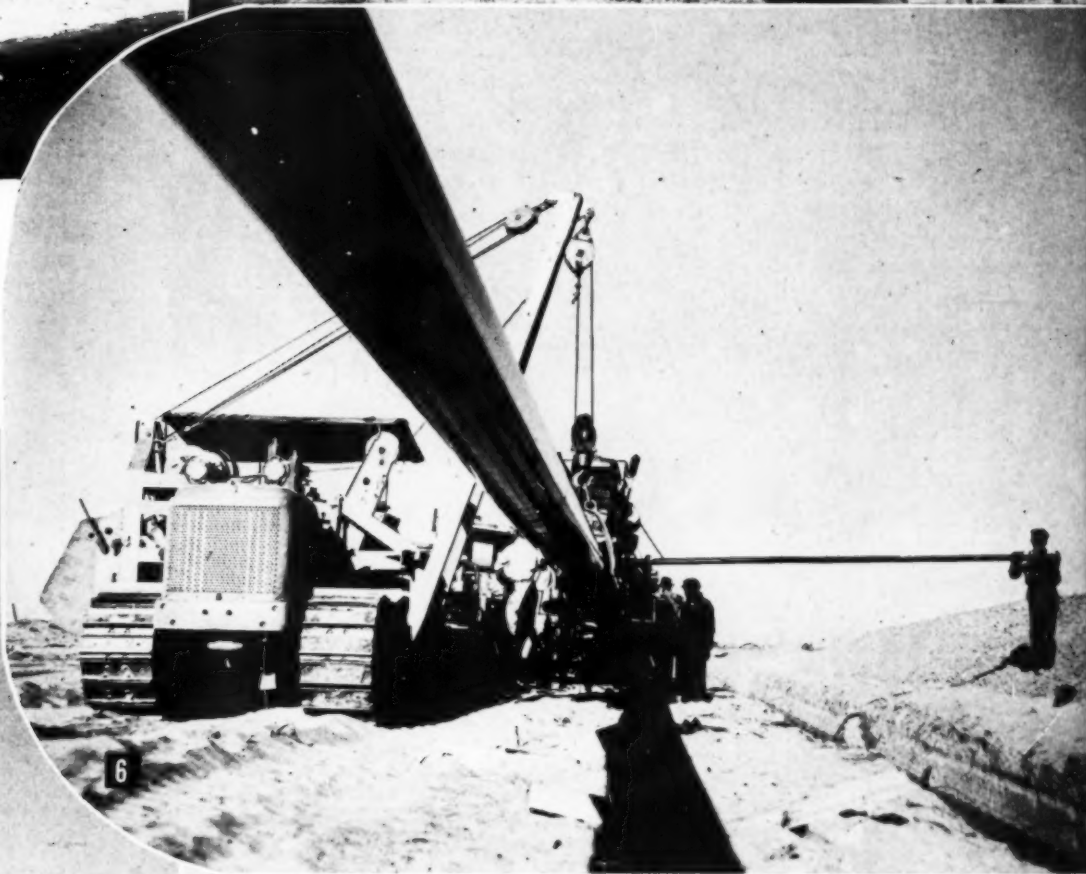
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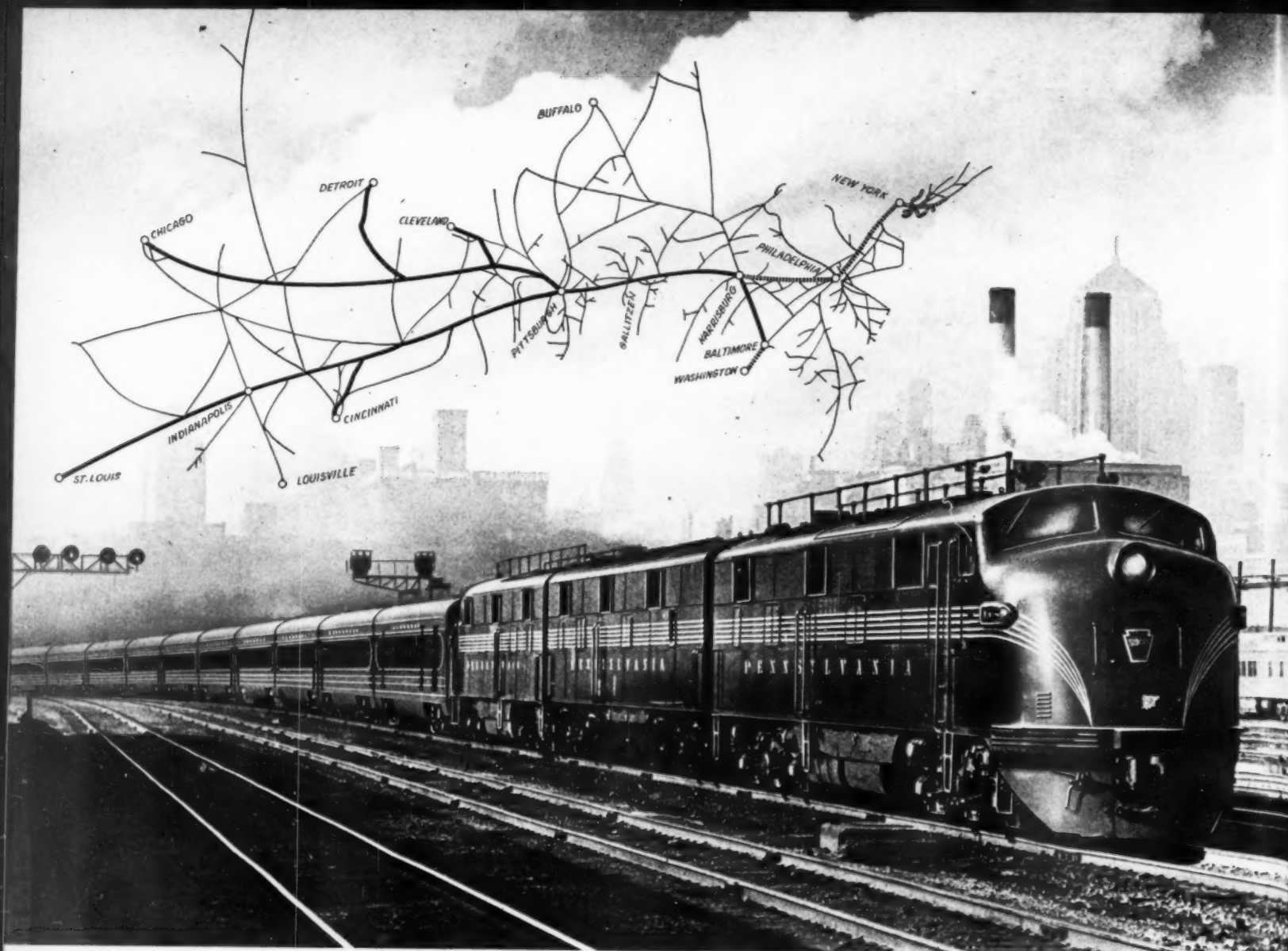


e. Doping
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Fig. 6 Counterweights on TD-24's outboard side balance terrific weight of pipe during doping operation.

Fig. 7. Equipped with Bucyrus-Erie angle-doxer, diesel backfills after pipe is laid.





THE "PENNSY"

By CHARLES F. A. MANN

"Broadway Limited" pulls out of Chicago with 6000 hp EMD diesel in charge. Map inset shows Pennsylvania System. Heavy black lines represent dieselized routes. Electrified lines denoted by cross-hatching.

World's Largest Railroad Challenges Union Pacific and Santa Fe for Diesel Supremacy

BY June 12 of this year, the Pennsylvania Railroad, America's biggest railroad, will have received or have on order for speedy delivery a grand total of 873,000 horsepower of diesel electric locomotives. By the time this is printed, chances are more than even that the Pennsylvania will have placed an order for another hundred 1,000 hp. diesel switchers, which will crowd the entire statistical picture of diesel motive power on this vast \$3 billion dollar railroad empire close upon a cool million diesel horsepower!

No other railroad in all the world is like America's mighty Pennsylvania. The spread of its high traffic density rail network; the size of its real estate investment; the complexity of its corporate structure; the extent and size of its roster of rolling stock, the vastness of its bonded indebtedness; the

total ton and passenger miles per year, are without parallel anywhere on earth!

So big is its military-type personnel machine that those in the top 14 levels of management cheerfully and unabashedly refer to the company's human forces as "The Hierarchy." Nowhere but on the Pennsylvania Railroad would this be taken by the top officers to mean anything less than a mean insult.

Pennsy is big, sprawling, terrifically busy, and at times utterly clumsy. Everybody knows it and all except these tearer-downers that seem to be in fashion today, have nothing but profound respect for the way the Pennsy handles the terrific problems peculiar to it alone of all other U. S. corporations.

A good thing on the Pennsy calls for not less

than a \$50,000,000 investment in innumerable duplicates for merely an intercity test run. More passengers cram on to more passenger trains per day than any other system. It possesses the worst railroad headache in all the world—the Long Island—whose utterly unprofitable, unappreciated and unloved fleet of trains counts larger each day than all the trains operating West out of Chicago put together. These trains leave from the same Penn Station in New York that forms the Terminal for the biggest fleet of high-profit passenger trains on earth—at the other end of the platform!

When Pennsy fell for the rigid frame type of "Mallet" steamer a few years ago, the big 4-cylinder coal fired monsters operating between Pittsburgh and Harrisburg, it had to build not five or six, but 79 of them before it could come up with a

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good, honest test as to their unsuitability!

When all the trunk lines East of Harrisburg were electrified, approximately 1,000 locomotives, or a fleet of steamers big enough to operate the entire Southern Pacific Railroad, went suddenly into mothballs to later save the day for wartime Pennsy traffic loads, only to wind up as liabilities on the 1946-1947 annual report.

When they began talking of diesel motive power on the Pennsy, it wasn't a dainty idea of buying a few to flit about here and there before the Publicity Department's bevy of cameras, but it was taking a plunge that would swiftly dieselize a fleet of "Name" feature passenger trains larger than all the name trains operating west out of Chicago and St. Louis combined! It is either think in terms of millions on the Pennsy or forget it. They threw away all their adding machines that merely added up to the 100's or 1000's years ago . . .

Basically, for twelve years, the Pennsylvania Railroad has watched, and nursed its magnificent, high-speed electrification between New York-Philadelphia-Harrisburg-Washington. The big question was how soon to electrify on to Pittsburgh and over the Big Hill at Gallitzin?

The combined effect, both from a mechanical and financial standpoint of having a magnificent segment of electrification and a huge fleet of good but unused steamers in storage, caused the Pennsy to "sit it out" when the dawn of diesel came in 1934-1936. A great many people said Pennsy was against diesel just because it was the one railroad that could effectively capitalize on electrification. But thoughtful study will reveal that Pennsy's real problem was to choose the wisest course in raising the whole tempo of operations by whatever sound mechanical means were available in the whole territory west of Harrisburg.

The electrified zones raised the tempo of the whole vast operation in the Eastern Region. In late 1947, the decision was made to do exactly the same in the whole area west of Harrisburg with diesel.

It was a bold, far-reaching decision to go diesel for the world's biggest coal carrier! But with combined operating results showing that diesel, even on the hard-driven Pennsy, would cut maintenance and operation by not less than 33% over steam, it was either do this and save \$15,000,000 per year on the western main lines of the system, or politely tell the coal people that they'll face a raise in freight rates. Take your choice. If, in the future, electrification to Pittsburgh becomes economic and financially possible, the fleet of diesels can be pushed out to secondary main lines or into a 100% program of diesel west of Pittsburgh. If it does, Pennsy will then need 5,000,000 diesel horsepower to do this job alone!

The Big Hill at Gallitzin is peanuts compared with a typical western mountain half-size ant hill, peanuts, yes, except for the fact that over this single crossing of the Alleghenies passes more tonnage and more passenger coaches per 24 hours than all the railroads haul in the whole territory from the Mississippi to Texas and Montana, in the same 24 hours!

It may be an anthill geologically, but it is a traffic "Himalaya" of the first magnitude. Over 60 crack

passenger express and solid mail trains cross this summit in a single 8 hour period each night, not counting extras or locals! Nothing like it anywhere on earth except right on the Pennsylvania.

Fitting beautifully into high utilization of motive power possible with diesel, is the innovation of 100-125 car 6000 ton freight trains originated by the Pennsy long before any other railroad.

As of April 30 of this year, 23 feature trains and 11 intermediate passenger trains were already programmed for diesels in the western territory. This territory extends from Harrisburg, where electrification ends, to Pittsburgh, Cleveland, Chicago, Detroit, Cincinnati and St. Louis.

As of May 30, 154 diesels were already in service, made up of 57 road passenger and freight diesels and 97 diesel switchers. As of that date the Pennsy had forty 6,000 hp. diesel passenger locomotives; fifty-one 6,000 hp. diesel freight locomotives and 275 assorted size diesel switchers in service or on order, totalling 781,000 horsepower. In June additional orders for fourteen 2,000 hp. passenger diesels; twenty-three 1,500 hp. freight diesel units and twelve 2,000 hp. heavy transfer-road-switcher diesels, at a cost of nearly \$10,000,000, raising the grand total to 873,000 horsepower. And another 100 diesel switchers may soon be announced!

At first the 6,000 hp. freight and passenger diesel was the pet idea of the operating department. But gradually, like their original dream of 7,500 hp. diesel units two years ago, these are being scaled down to 4,500 hp. freight and 4,000 hp. passenger combinations which, except for four principal heavy-grade territories, will move the 6,000 ton freights and the 15-17 car passenger trains that are maximum standard for the system.

To make this great fleet of diesels work, shop facilities costing over \$17,000,000 are programmed for all parts of the system, centering principally at Harrisburg and Altoona, Pennsylvania. Additional shops are scheduled at Chicago, East St. Louis, and Baltimore. At these points most of the passenger and freight operation can conveniently change engines or change to electric power.

Already astounding records are piling up on diesel operation on the Pennsylvania. All the freight locomotives together have so far averaged out better than 12,000 miles per month!

Gross ton miles per freight train hour, the old reliable barometer, average from 90 to 140,000 ctm. per hour. Schedules are easily maintained

and helper service is reduced to a minimum. But soon the major helper work at Gallitzin—in the territory 12 miles to Altoona and 25 miles to Johnstown, will likewise be diesel.

Freight diesel operation, like the passenger diesel operation, is confined to fast, long-haul tonnage trains. From Harrisburg to Chicago the LCL1 and LCL3 and the CG8 and WS4 are the "feature freights" already assigned with diesels for the whole distance.

From Harrisburg to St. Louis, the SW1 and BL7 and SW8 and DL2; and from Harrisburg to Cincinnati the CIN1 and CIN2 are all regularly assigned with diesel locomotives. These are the freights that the nation's biggest shippers can rely on, like the Broadway or the Spirit of St. Louis, and can ascertain within a few miles and a few minutes where each boxcar of precious stuff is any hour of the day or night, by merely calling the Pennsy traffic department.

Diesel is making timetable freight operation possible on the Pennsylvania west of the electrified zone at Harrisburg.

Every one of the builders of diesel power have their books covered with Pennsylvania orders. The Baldwin 3000 hp. road units; EMD's F.3 and passenger types; the Fairbanks-Morse 3-unit 6,000 hp. freighters and road switcher-transfer types and American Locomotive 1500 hp. road freight units. All share in the switcher orders.

Electric braking is not needed on the Pennsy because of easy trackage throughout the system.

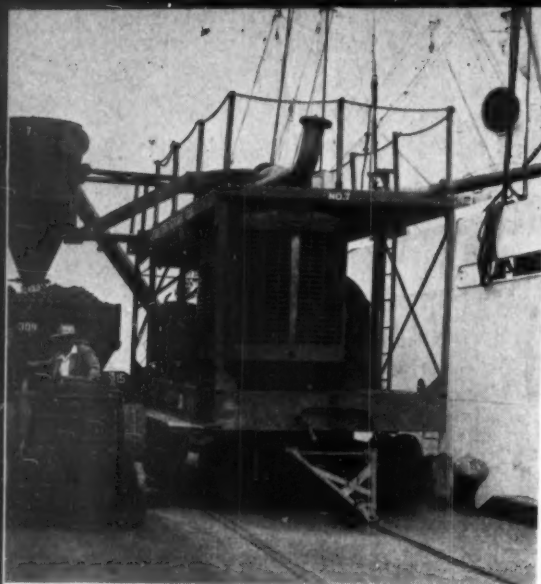
So, America's biggest corporation and the world's biggest railroad goes diesel at a terrific pace. And they said "It Can't Happen Here," but it did!

But, if, when one visualizes the future, coal is capable of being converted to diesel fuel oil, again the Pennsy will arise with a monumental biggest of all statistic, for it will probably be the biggest railroad user of diesel fuel oil made from the very coal mined along its tracks, that now may perhaps frown over the loss of coal for fuel for the vast fleet of Pennsy steamers that will soon be headed for the scrap pile.

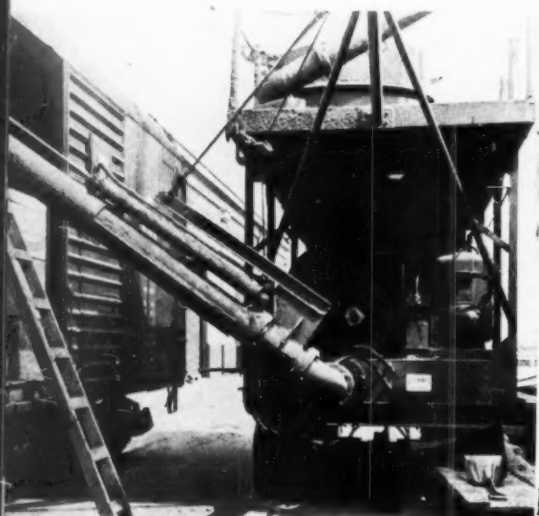
Meanwhile, in the next four months, the Union Pacific, Pennsylvania and Santa Fe may scrap it out on a daily basis, to see just who really is the largest user of diesel locomotives in the world. So far, during the summer, the Santa Fe will retain its crown, but in the Fall, the race will narrow down to the UP and Pennsy.



Pennsylvania Mainline Freight east of Pittsburgh with 6000 hp. Fairbanks-Morse diesel locomotive at the head end.



Buda-engine portable blower machine empties copra filled vessel. Below, unit loads freight car.



DIESEL-PNEUMATIC HANDLING

By FRED M. BURT

FROM South Pacific islands, especially the Philippines, copra (the dried meat of the ordinary coconut) is brought to the United States, loaded as bulk cargo in the holds of ships. Thus packed its weight averages about 40 lbs. per cubic foot.

Countless uses have been found today for copra. These chiefly are in the manufacture of soap, margarine, mayonnaise, plastics, nylons, oils and paints. The meal resulting after copra has been crushed and its oil extracted, is a highly concentrated food for dairy cattle.

The development and use of pneumatic loading and unloading machines for the handling of such bulk cargoes, along with auxiliary pipelines and blowers for warehouse storage distribution, has provided revolutionary improvements as to speed, efficiency and cost. More than 90% of the copra coming into the United States is unloaded by Sutorbilt conveyors.

The Metropolitan Stevedore Company pioneered the use of this suction method of unloading copra, in Long Beach in 1929. The company's manager, T. W. Buchholtz conceived the idea for this application of air conveying and the blower machines were further engineered and built by the Sutorbilt Corp., headed by Robert S. Clark, one of the original designers of this equipment.

Metropolitan now has a fleet of 10 blower machines, four of which are electric, and six powered with 8 cyl. Buda Model 8-DC-1125 diesel engines, developing 160 hp. each, at continuous service.

The four electric-powered units are scheduled to be converted to diesel units.

Using diesel engines, the standby electric power charge is eliminated. Each blower machine will operate at normal capacity, unloading about 35 tons of copra per hour (one reached 62½ tons), consuming about nine gallons of diesel fuel. A check on one of the electric-powered blowers for one hour's normal operation, showed a power cost of \$2.28.

The six Sutorbilt, No. 2260, 40.7 cfr., 250 rpm. blowers, cyclone product recovery units, rotary seal valves, with the diesel engines and other auxiliary equipment are mounted on special Utility Trailers. These trailers are 8 ft. wide x 22 ft. long x 13½ ft. high; mounted on 3 axles with 12 pneumatic tires for an overall load rating of 51,000 lbs. They can be towed at a road speed up to 40 mph. While used principally at Long Beach and Los Angeles Harbors, some of these units have been used in both San Diego and San Francisco.

To go into operational detail, let us use for example, the new copra handling installation at the Spencer Kellogg & Sons plant, Gerrits Channel, Terminal Island; designed and engineered by Sutorbilt under the direct supervision of Mr. Clark and Mr. Buchholtz, in close cooperation with James Stewart Corp., Chicago, contractors for the plant.

Six pipelines allow the use of up to six air conveyor machines, with upwards of 180 tons per hour unloading capacity. On the suction side of the machine, an 8 in. flexible pipe pulls copra

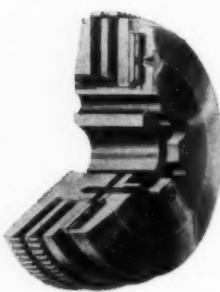
THE majority of new clutches which have been developed for heavy duty industrial use in the past two or three years have been air operated since this type of clutch has the advantages of convenient remote control, small manual pressure required for full torque, smooth starting, and controlled torque. Although pioneer models had many "bugs" which discouraged early users, there are now on the market several air clutches which have proved themselves under the most exacting field tests.

One of the first designs was a disc type friction clutch which featured direct axial pressure application by compressed air in a flat, circular tube of shaped rubber with fabric reinforcing. The clutch was extremely simple and compact yet had greater torque capacity than radial type clutches.

This clutch was first used on heavy earth moving equipment and registered under Osgood patents. It has already been used with marked success in the oil fields on winches and deep drilling rigs, many powered by diesel engines.

The manufacturers of this clutch, the Wichita Foundry & Machine Company of Wichita Falls, Texas, are sole licensees under the Osgood patents. Maintenance has been greatly simplified by keeping all air connections outside the clutch where any leaks may be quickly detected and easily re-

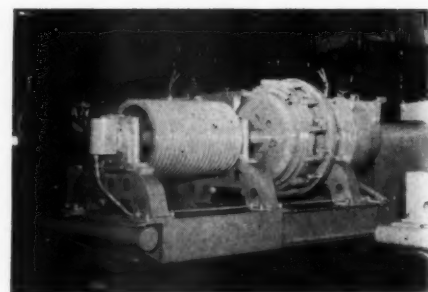
New Air Operated Clutch



paired. There are no packings to leak and let water or oil onto the friction surfaces. There are no diaphragms or gaskets to fail or blow out. Only two wearing parts, both low cost items, are easily replaced without disturbing the shaft.

The clutch is unaffected by centrifugal force. A series of strong springs insures free release when the clutch is disengaged and gives freedom from self-engagement.

The clutch body and plates are made of high quality, close grained alloy iron. Although the clutch is made in both single and multiple plate sizes, with two or four friction faces, only the single air-tube is needed to engage all faces. No heat from the friction surfaces can burn this tube since it is fully protected by both asbestos insulation and air space. Cooling air passages keep the



Air tube clutch installed on diesel pump drive.

entire clutch at safe temperatures even under heavy loads and long hours of continuous use.

Friction discs are moulded asbestos with woven asbestos facing, moulded integral on both sides. This construction has been found to give smooth, easy engagement and extra life. The full width moulded asbestos driving teeth reduce wear on the teeth of the driving ring.

Friction discs are made in halves and the air-tube is split on one side, allowing easy removal without affecting the shaft.

The Wichita Air-Tube Disc Clutch is available as a pulley type clutch and as an enclosed housing power take-off clutch. It can also be used as an engine clutch with a link type coupling. This coupling has rubber and fabric links to act as a shock absorber and cushioning element.

ATIC HANDLING OF BULK CARGOS

re scheduled to out of the hold to carry it into the side of the cyclone recovery unit on top of the trailer, above the blower. Just above the inlet level there is a baffle plate ring, projecting horizontally inwards from the circumference of the cylinder. The copra is thus prevented from being pulled upwards by the swirling, strong, "cyclone" air stream which goes up inside the ring and out through a 10 in. pipe in the side to the blower to pick up the copra on the blower discharge side, and blow it onwards after it passes through the Rotary Seal Valve, or vane-feeder.

Dropping down into the discharge hopper, the copra is fed into the five-vaned, rotary seal valve, powered with a 7½ hp. motor, with electricity from a generator connected to the Buda diesel. Turning at 18 rpm., the rotary seal valve delivers the copra against the exhaust pressure in a 10 in. Penflex flexible pipe, which is bolt-connected in 10 ft. lengths to one of the permanent pipes in the dock house. The six pipes run through the dock house, and then out and up to the top of the scale house.

Here the pipelines run into three large, cyclone recovery units to drop the copra down into garner bins. After this 400 ft. plus travel the air is very tired, so it is allowed to pass into the outer atmosphere. From the garner bins the copra drops down to the floor below to be weighed. When a certain amount registers on the scales, the scale operator records the amount and then releases a lever, allowing the copra to drop into the common garner bins located on the second floor.

From here the material falls to the first floor of the scale house where it is fed into a rotary seal valve which meters it into the discharge side of one of the 22 x 60 Sutorbilt blowers. Each of these is powered with a stationary Buda diesel, the same model used on the portable units.

From here on the copra is carried through the 14 in. pipes of the stationary unit, out and up and through a warehouse not used for copra storage, to a diversion valve. Here it is diverted to either of two warehouses (for a total additional travel in the stationary unit of about 400 ft.) and so into the recovery unit of either warehouse. This drops the copra on to a belt conveyor which runs at a high level in the building and can be manually operated to drop the copra in storage piles wherever desired. This aerated copra has an average weight of about 32 lbs. per cubic foot. This complete air conveying system is the largest of its kind in operation today.

Another equipment set-up on the portable blower machines has a telescoping pipe on the exhaust side for use in loading railroad cars. The procedure can be reversed to unload cars; in fact the versatile equipment is so flexible in its methods of operation that it can be used for many purposes. It is ideal for handling not only copra, but also palm kernels, flax seed and other commodities of like nature. It has been used to suck or blow fumes from ship holds. When stationary, permanent equipment of like nature breaks down, these portable units can move in and take their place. With their self-contained, Buda diesel power units,

they can operate any place they can reach.

Included among other Sutorbilt air-conveying blower units with Buda diesel engines are eight in the San Francisco Bay area, two new ones at Port Houston (Texas); for loading copra in the South Sea islands, in Batavia, Dutch East Indies (2); in the Philippines (1); and in Tahiti (2). With the low cost and great mobility of the diesel-powered portable units; the factor of breaking the flow wherever desired for weighing and then air-conveying for further long distances with stationary, power-blower units, many additional uses may be expected for such methods and equipments.

Successful use of the pneumatic conveying system for the unloading of soda ash, with the elimination of irritating dust as a health hazard opened the way for conveying of borax, lime, grains, sugar, and other bulk products. For instance, in a chemical process plant, a unit handles five tons per hour of hydrated lime from kiln to processing or to any one of 12 storage tanks from 100 to 300 feet distant. It also serves to pick up from any storage tank and return to processing. In a brewery, a pneumatic machine unloads grain and rice, 7 to 10 tons per hour, from railroad cars to any one of six storage tanks. Another advantage is that a clean, thorough unloading job is done due to the flexible, portable hose being guided to get into small corners. In an almond plant, a unit moves 50 tons per hour, of almonds in the shell, from warehouse to processing, a distance of 250 feet.

It all adds up to the fact that controlled air is giving fast, efficient, dustless, and inexpensive handling to a wide variety of products. When you stack a diesel fuel bill of about 90c hourly against unloading 30 to 35 tons of copra, it is quite inexpensive, as maintenance costs are also low, and one man can operate the unit.



SOME months ago, this publication carried details of towboats built for the Argentine government, making some mention of the considerable program undertaken there for utilization of various rivers for peacetime transportation and possible wartime defense purposes. Argentine is spending much money in a thorough effort to develop waterways transportation in all its aspects, but this is not the only country to the South where rivers always have been of great importance and can be made of far greater use.

Brazil is another country of vast expanses and distances, served by mighty rivers. The Amazon, for one, is greater than our own Mississippi and Missouri, is navigable for mileage running into the thousands, and for ages has been the main highway from the coast to the mountains. And as for improving navigation possibilities, there are two means open. One is to do as does the United States, appropriating the billions for flood control, levee systems, short cuts and channel deepening; the other is to provide boats able to use a greater

Diesel Cargo Boat For Brazil

length of the rivers "as is" without a staggering investment in public works. And as Brazil has longer channels to improve and less income with which to do the job, the answer to river transportation appears to be suitable boats.

So Brazil is adding to her marine transportation equipment, and the first boat in the program of enhanced waterways utilization has been shipped to this big republic in the South.

Higgins, Inc., New Orleans, designed and built this rather odd little craft, this small boat with a purpose. She is a cargo boat pure and simple, though only 75 ft. in overall length and with a beam of 20 ft. 6 in. On a draft of only 2 ft. 10 in. she can carry 45 tons of cargo. Nineteen tons more, a total of 64 tons, can be carried by increasing the draft only a foot more. The designers also figured that this little ship might be able to push or pull more than she can carry, and so they mention that by the installation of towing knees forward this boat could do a pretty good job of towing. "Towing," on a river boat, means pushing as well as pulling.

Propulsion power is diesel, as might be expected, and the designers selected a rather unusual power plant. The considerations were ample power at low speed, simplicity, dependability, ease of serv-

ice, and the need for a minimum amount of hull space; not too many engines seemed to fit these specifications, but they seemed right down the alley of one particular engine, however, the Venn-Severin diesel.

Two engines of this make are installed in this twin-screw boat. These are the type HCV marine, supplied by this manufacturer in models from two to ten cylinders; in this installation, the 4 cylinder models are used, with cylinders 7 in. diameter and 8 in. stroke, each developing 125 hp. at 900 rpm.

Overall weight, including the reverse-reduction gear, is only 6500 lbs.

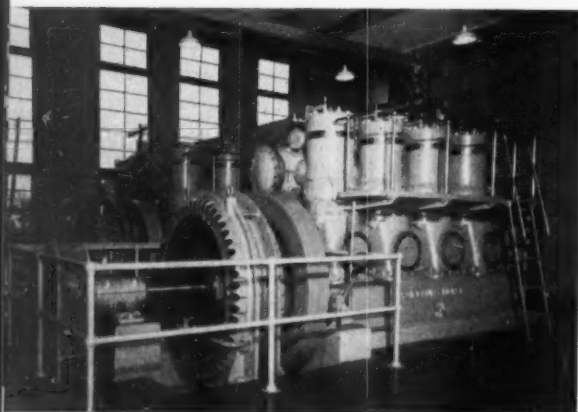
Fuel injection is the Demco. (Diesel Engineering & Manufacturing Co.) A built-in governor is included, the Pierce fly-ball type. Fuel filters are Commercial, with lube oil filtered by Fram and cooled by a Harrison lube oil cooler. Cooling is closed circuit, using a Ross heat exchanger. Starting is electric; reversing mechanism is a Snow-Nabstedt reverse-reduction gear.

Hull form, as might be expected from so much beam and so little draft, is practically flat-bottom, with twin tunnels aft in which the propellers are placed. No big crew is necessary, the builders stating that two men only are required for operation.



New brick building houses Sanborn diesel plant.

The two four-cylinder 300 hp. Fairbanks-Morse diesels responsible for Sanborn plant's financial success.



Sanborn, Iowa

New Municipal Diesel

Plant Runs Up 105%

Profit in 9 Months

By T. J. MALONE

"IF A community puts in a diesel-powered electric light and power plant, how soon will that plant begin to make money?" Sanborn, Iowa, a town of 1,500, comes up with the answer—definite, impressive, somewhat jubilant maybe. Its answer is: from the first day of operation.

Sanborn's spic-and-span, brand-new municipal plant—two Fairbanks-Morse diesel engine units, of total 600 horsepower and 400 kilowatts capacity, housed in a handsome 45 x 75 tan brick and tile building—began operating June 19, 1947. On March 31, 1948, after nine months and eleven full days of supplying electricity to streets, homes, school, churches, public buildings and business places, the plant had made a profit over all operating expenses of \$14,316.69. This meant an average profit of \$50.05 a day for the 286 days.

Operating expenses for the period had been \$13,612.16; operating receipts, \$27,928.85. The difference—earnings, profit—represented 105 per cent on the amount expended. For every dollar spent in operation, a dollar came back to the plant; and that incoming dollar led another dollar and five cents by the hand!

Sanborn invested \$142,000 in its municipal power plant. This amount covered everything; land, building, diesel engine units and accessories, other equipment and distribution system. The

whole investment was cared for by issue of revenue certificates, liens against future earnings of the plant. Not even a shoestring was necessary to start with—only the good faith and credit of the community.

By May 1, 1948, payments of \$5,000 had been made to retire certificates. Terms of payment permit calling many of these bonds on or after November 1, 1954, so that much of the debt may be paid off in advance of stated dates as earnings warrant.

A privately owned plant powered by gasoline engine first supplied some electricity to the town. This was so long ago that neither the oldest inhabitant nor the archives of Sanborn throw light on the starting date. It was surely before 1900. A steam plant succeeded the gas one, under a series of private owners. Then came a 25-year stretch of transmission service by a private utility.

Agitation for a municipally-owned, diesel-powered plant began in 1934. In an election on a proposal to install and operate such a plant, held December 12, the next year, the yes votes totaled 442, the no votes 211. The utility's franchise had some years to run and onset of the war further delayed action. On June 19, 1944, a second election was held, the yeas winning, 311-92. Then, after ten years, things moved fast.

The two Fairbanks-Morse diesel units were kept busy from the start. In the 286 days ended March 31, 1948, they generated 1,019,600 kilowatt hours of energy, an average output of 11.74 kilowatt hours to a gallon of fuel oil. One engine ran 4,806 hours, at a 11.22 kwh. average; the other 4,847 hours at 11.82. Roughly, each engine drew a rest of eight hours in every thirty-six of its own time.

Output and peak loads by months were:

1947	Volume	Peak
June	46,900 kwh.	245 kw
July	95,700	270
Aug.	102,300	270
Sept.	101,900	270
Oct.	97,000	340
Nov.	109,800	360
Dec.	113,200	360
1948		
Jan.	119,800	340
Feb.	122,800	320
Mar.	110,200	300

Meters served in June, 1947, numbered 523; in March, 1948, 582. New stoves and water heaters accounted for the increase: In March, there were 58 stoves and 87 heaters.

Long before that 360-kilowatt peak was registered, plant authorities knew they'd have to add another engine. Neither engine on the floor, with its rated 200 kw. capacity, could alone serve any of the peaks.

A third and larger diesel was bought, also Fairbanks-Morse, six-cylinder, 690-horsepower, 473-kilowatt. When installed, it would give the plant a combined 873-kilowatt potential.

In all the equipment, a power remote-control panel is the pride and joy of the engine-room force. This panel controls all circulating water pumps, fuel transfer pump, air compressor, a pyrometer and a plant signal system (horn and lights), indicating failures in high and low water pressures, high and low water temperatures, and high and low lubricating temperatures.

Generation cost in the period to March 31, 1948, averaged 1.1006 cents a kilowatt hour generated. The cost, to the plant, of delivering a kilowatt hour at the consumer's meter, averaged 1.335 cents, computed on total generated volume. The average amount received for a kilowatt hour averaged 2.739 cents, also on full energy output.

The municipal plant has continued the utility's latest rate schedules to consumers. They are, monthly, net:

Residential

150 kwh. at 3 cents
Excess at 2 cents
Penalty: 1/2 cent per kwh. up to 50 kwh.

Commercial Light

60 kwh. at 6 cents
90 kwh. at 4.8 cents
2850 kwh. at 3 cents
Excess at 2 cents
Gross Penalty: 1/2 cent higher than net on first 60 kwh.

Power

200 kwh. at 5 cents
300 kwh. at 4 cents
2500 kwh. at 3 cents
Excess at 2 cents
Penalty: 1/2 cent per kwh. on first 150 kwh.

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PROGRESS

Water Heating

1.5 cents per kwh. up to 1500-watt unit;
over 1500-watt unit, 2 cents per kwh.

Major users of power include a creamery and
milk-processing plant, a railroad roundhouse turn-
table, three grain elevators, two locker plants and
three machine shops.

Apart from free lighting of a public ice skating
rink, there are no "free services." The town
council pays \$74.59 a month for street lighting
and the plant absorbs the excess. This excess has

averaged about \$75.00 a month.

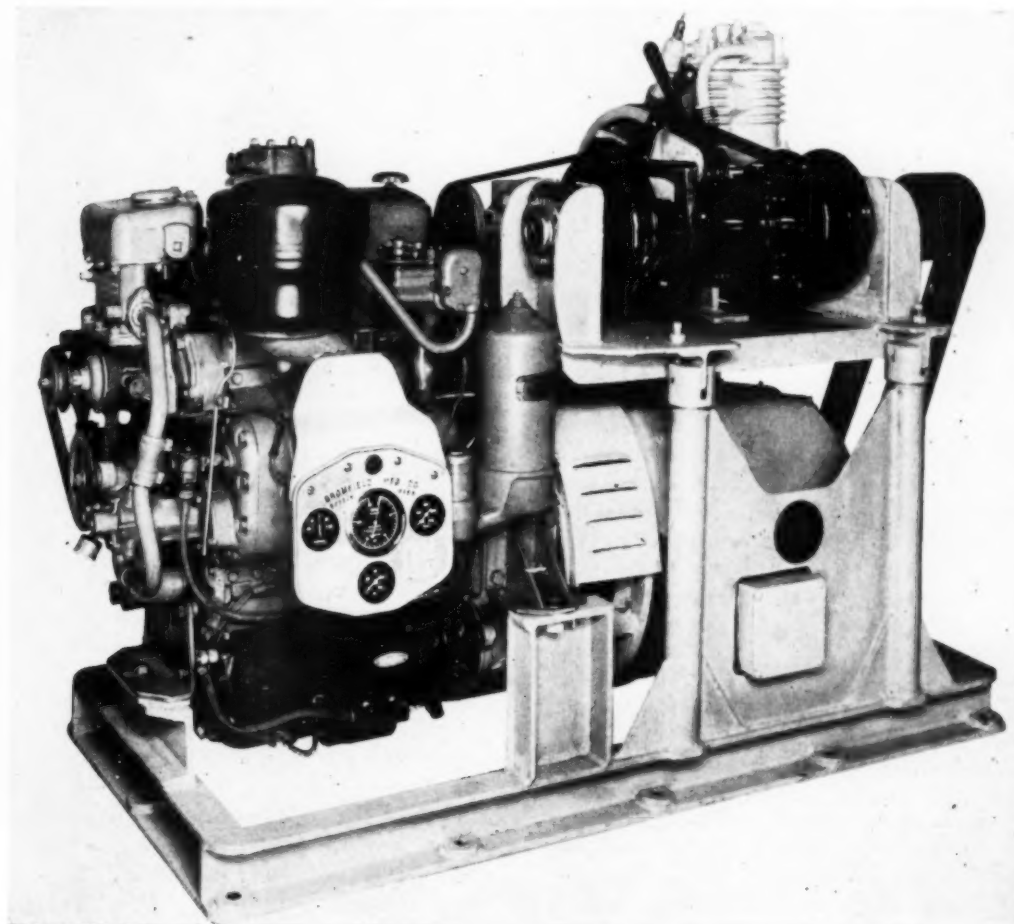
A Board of Trustees, appointed by the mayor
and confirmed by the council, governs the plant.
Members are Dr. E. W. Eason, Earl W. Mayne
and G. A. Baldwin. M. D. Geving is plant super-
intendent.

Superintendent Geving, late of the United
States Navy, claims a unique distinction for his
plant—that it is the only municipal power plant
in Iowa with an all-G.I. crew. He says it is that,
so far as he has been able to learn. This hundred
per cent saturation didn't just happen; it was

planned that way. Two of his three operators are
navy men and one is army. That puts pressure
on the army man in debate, three against one,
but it is said he holds up well.

The army man suffered shrapnel injuries in
shoulder and hip at Cherbourg but their effect
doesn't impair his work in the plant. Another
operator lost half of a foot in a test run in the
Atlantic, but the loss doesn't seem to interfere
with his running that engine. He takes his turn
on the lines too, and climbs a pole like—like a
veteran.

COMPACT DIESEL AUXILIARY UNITS



Bromfield unit incorporating 2 cylinder General Motors diesel, 15 kw D.C. generator,
160 gpm. centrifugal pump, and two stage compressor.

auxiliary unit.

The Bromfield engineers designed a unit em-
ploying a Colo diesel direct coupled to a marine
type generator with a pump and compressor
mounted on either side of the generator. The
first of these units was installed aboard the
schooner Shamrock, in 1923. Although the en-
gines used at that time were relatively cumber-
some, the auxiliary unit proved to be very satis-
factory.

As years passed, the heavy, slow speed diesel
engine with its hand cranking and preheating
units were replaced by a more compact moderate
speed engine with electric starting.

Today, the General Motors series 71 diesels are
employed for a horsepower range of 34-165 hp.
The Hallett diesels are furnished for horsepower
requirements ranging from 6-18 hp. These two
engine models provide a horsepower range suit-
able for auxiliary units with generator capacities
of 3-80 kw.

Then too, the cumbersome cast iron base has

been eliminated in favor of a light, rigid fabri-
cated steel mounting. Smooth-running, steel-cored
rubber V-belts, requiring no lubrication, have re-
placed chains.

Over a period of 25 years that these units have
been built, Bromfield engineers have constantly
improved their design. Many problems, such as
vibration, belt slippage, and clutch wear, have
been successfully overcome. In order to obtain
greater compactness, it became necessary to de-
velop a small, powerful friction clutch. This
wedge action, spring-loaded friction clutch oc-
cupies a minimum of space, yet provides the neces-
sary friction surface for trouble-free operation.

The equipment is arranged for greater possible
accessibility and compactness. Pump, compressor,
countershaft, and clutch assembly are mounted
above the direct-coupled generator where they
may be easily adjusted. This entire upper as-
sembly, if necessary, can be easily removed as a
unit, by withdrawing 4 pins from the supporting
costs, thus allowing free access to the generator.

THE development of the auxiliary unit has
closely paralleled the improvements of engine
room layout of the fishing trawlers. In 1921, the
Bromfield Manufacturing Company, Inc., first de-
veloped and pioneered auxiliary sets for ship-
board use. Up to this time, a farm-and-home
gasoline generating set was in common use for
supplying electricity. Then, in conjunction with
this, motors were employed for driving a water
pump and an air compressor. This arrangement
required a relatively large amount of space in
engine rooms where space is at a premium.

It was about this time that fishing vessels were
converting from gasoline to diesel power for main
propulsion. The chief advantages were lower fuel
and insurance costs. However, on vessels using
a diesel for main propulsion and a gasoline
auxiliary set, the insurance rates would be the
same as if the main engine also used gasoline.
The need arose for a diesel-driven auxiliary unit.

In those days, manufacturers of small diesel
engines in this country were not to be found.
Therefore, it was necessary to survey the Euro-
pean countries, and after purchasing some engines
from England, Austria and Germany, the com-
pany was finally able to develop a diesel driven

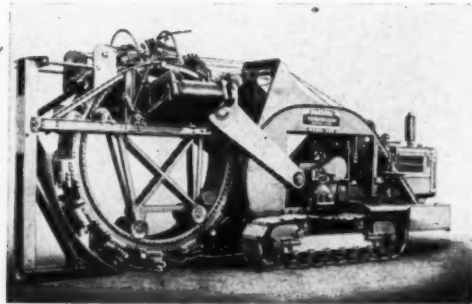


ROAD BUILDERS DEMAND DIESEL

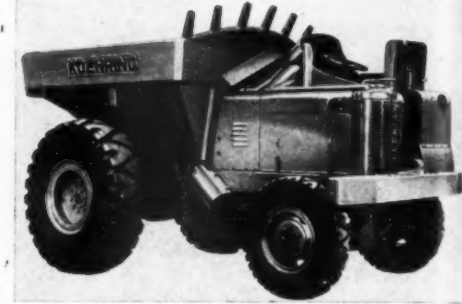
Chicago Road Show Stresses Growing Trend



LeTourneau "Tournapull" with scraper is diesel-engined as are larger models.



Parsons Trenchliner attracted much attention digs 20-foot of 6-ft. trench per minute.



Koehring Dumptor offered with diesel, a high speed earth mover for construction work.

TWO weeks ago the curtain rang down on one of the greatest displays of massive earthmoving and roadbuilding equipment ever seen in the world. Soldiers Field in Chicago was crammed full of heavy equipment leaving barely enough room for the tens of thousands of interested spectators many of whom had travelled halfway around the world to be present. The American Road Builders Association gets the credit for making the Show possible in conjunction with its 45th annual convention.

Fifty-four foreign nations sent delegations of highway engineers and officials—only four nations short of the 58 nation-members of the United Nations itself. July 17th was International Day and the Show management did itself proud in making the international visitors feel at home.

Over 300 exhibitors were represented with displays and equipment covering the full 27 acres available for show purposes.

When one considers the background of this convention and Road Show one can appreciate the significance of this affair. Over a billion and a half dollars will be spent for highway and airport construction in the United States. For equipment to carry on maintenance alone, State, county and municipal governments will spend \$240,000,000 in 1948. Another \$265,000,000 will be required for equipment for new projects. Furthermore it is estimated that an additional 150,000,000 for new equipment will be required to bring construction inventories up to normal. No one can yet accurately estimate the sums which will be spent by the foreign nations for road rehabilitation and construction. It is in the billions.

That is why there was such intense interest in this show, on the part of people all over the world.

Beginning on July 16 and continuing until the 24th, there were a series of lectures and conferences devoted to the design and construction of highways and airports. Experts from all over the country contributed their knowledge and experience in the art of making better roads. Govern-

ment officials from the Public Roads Administration delivered talks as well as officials of the state highway departments.

Where did diesel fit into this picture? Frankly, everywhere. Such names as Allis-Chalmers, Caterpillar, International Harvester, and Le Tourneau in the earthmoving field with heavy duty diesel equipment were in prominence representing such diesel engines as Buda, Continental, Caterpillar, Cummins, Hercules, General Motors and Waukesha. The same was true in the shovel and dragline exhibits, the heavy duty trucks, and the road rolling equipment—It was all diesel.

Not content to see their engines installed in almost every type of road equipment, the diesel manufacturers had their own exhibits. General Motors had an extensive display featuring its entire line of Series 71 two cycle diesels. The exhibit which attracted the most attention was the recently introduced twin-4 236 hp. multiple engine unit designed for use in shovels of two to three yard capacity. This model consists of two 4-cylinder diesels mounted on a common base and with a common shaft. Throttle and clutch controls are such as to permit the engines to be operated singly or as a pair. Other General Motors diesels included a 58 hp. model for ditchers and excavators of $\frac{1}{2}$ yard capacity; a 93 hp. diesel of 3-cylinders for $\frac{3}{4}$ yard excavators; and a truck engine rated at 183 hp. Power units for crushers, asphalt plants and a variety of other uses rounded out the General Motors exhibit.

The Buda Company showed its complete line of power units ranging from the 1-cylinder, 5 hp. model up to the 410 hp. diesel. Also Buda's automotive models were on display.

An activated, cutaway version of a Cummins diesel spotlighted that engine company's booth. This engine showed clearly the operation of Cummins diesels and attracted sizeable groups of on-lookers who wished to find out what made diesels the talk of the show. Cummins, in addition exhibited five models—a 200 hp. supercharged auto-

motive diesel, a 275 hp. power unit, an industrial model developing 200 hp. and two other industrial diesels developing 150 and 250 hp. respectively.

Continental Motors Corporation utilized the Road Show as a backdrop for the first post-war showing of its basic line of industrial and transportation engines. Three diesel models including two transportation engines were on display.

J. G. Swain, Director of Sales, headed the Waukesha Motor exhibit which featured 3 new diesel models, the largest of which was rated at 190-210 hp. It was the first time that these new engines had been shown to the leaders of the construction industry and made quite a hit with them.

Fourteen of the engines in the Hercules exhibit were diesels. These ranged from the small 4-cylinder, 46 $\frac{1}{2}$ hp. model to the big "vee," supercharged 8-cylinder, 500 hp. engine. Meeting a rapidly growing demand for the pancake type engine, Hercules had on exhibit a 260 hp. "flat" engine, one of three such engine models now being built by the company for "low headroom" installations.

The exhibits of those companies manufacturing the roadbuilding equipment also stressed diesel application. International Harvester Company with 80,000 square feet of exhibit space put on a very impressive display. Five of the new TD-24 diesel crawler tractors, each with matched equipment were standouts in the literal sense bulking large above crowds of lookers-on. The distinctive red trademark of International Harvester brightened the already colorful show. Scores of individual displays, including all types of automotive and industrial power equipment showed the latest in equipment required by today's contractor. All tractors and other equipment were shown with matched equipment which made the exhibit of particular interest to the users and operators who were able to see the equipment as a complete work unit and not merely as a prime mover or power unit which had to be adapted to their special needs. Off-the-highway trucks produced by International in California were another interest-

AND DIESELS

rowing Trend to Diesels



el, a high speed work.

it, an industrial other industrial op. respectively on utilized the e first post-war trial and trans- models including n display. eaded the Wau- ed 3 new diesel ated at 190-210 se new engines he construction n them.

Hercules exhibit e small 4-cyl- "supercharged" ing a rapidly e type engine. "flat" engine, ow being built "installations. manufacturing stressed diesel ster Company space put on a he new TD-24 matched equip sense bulking The distinctive harvester bright- ores of individ- automotive and d the latest in ontractor. All re shown with the exhibit of operators who as a complete rime mover of apted to their ks produced by nother interest-



Tournadozer models such as this give operator full view of earth moving operation — dieselized at that.

ing feature. These giants are utilized over rough roads for hauling logs and other heavy loads.

Allis-Chalmers had an exhibit which rivaled that of the International Harvester Company in size and quality. 92 pieces of equipment were arranged around a 20-ton HD-19 crawler set on top of a large globe 24-feet in diameter. The front end of the crawler towered some 18 feet above the rest of the exhibit and symbolized the Show motto, "Better Roads For a Better World."

The Allis-Chalmers new HD-19 with its liquid drive torque converter was one of the featured exhibits, as was the cutaway version of the AD Motor Grader, and a cutaway model of a General Motors 2-cycle diesel. Allis-Chalmers diesel equipment was all powered by General Motors 2-cycle engines. It was estimated that the exhibited equipment was worth over one-half million dollars.

The Caterpillar Tractor Company exhibit under the able direction of C. E. Jones, Manager of the Sales Development Division complemented the color scheme of the Soldiers Field displays with the bright yellow which marks Caterpillar products. The array of Caterpillar diesel tractors was headed by the new D8, a crawler with 130 drawbar horsepower. These machines were equipped with the full line of Caterpillar earth moving accessories: bulldozers, scrapers, and rippers. Supplementing the Caterpillar array of "packaged" equipment was the allied equipment with which the company's machines are identified: Hyster Hystaways, Trackson Traxcavators, Earth Borers, Treedozer, Athey Mobiloader, and other associated accessories.

LeTourneau was represented in a big way with its complete line of earthmoving equipment. Featured was the new model Tournapull electric controls. One model of the big earthmover was arranged for "operation" by interested conventioners who took full advantage of the opportunity. There were no casualties.

These LeTourneau earthmovers were equipped with a torque-proportionating differential which has the effect of giving maximum wheel power



International diesel crawler hauling a Bucyrus Erie scraper of 22 yards struck capacity.

Caterpillar D6 diesel tractor equipped with Trackson Traxcavator.



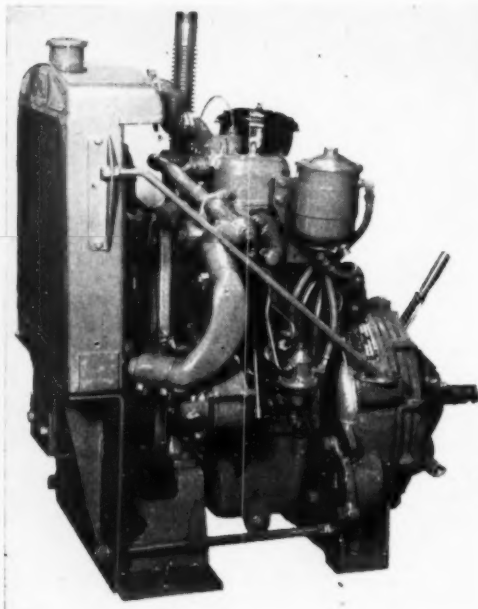
Allis-Chalmers' 40,000 lb. diesel crawler is powered by Detroit diesels and equipped with an hydraulic torque converter.





Diesel engined Lima shovel loads a White truck.

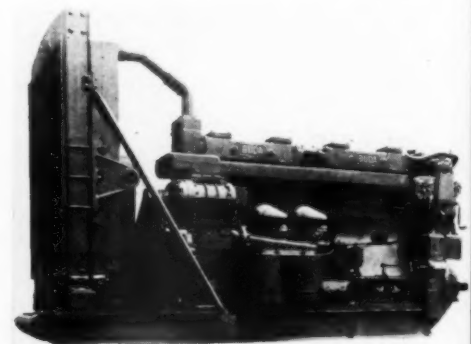
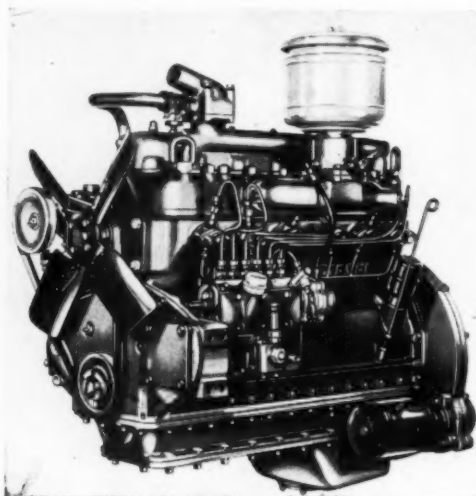
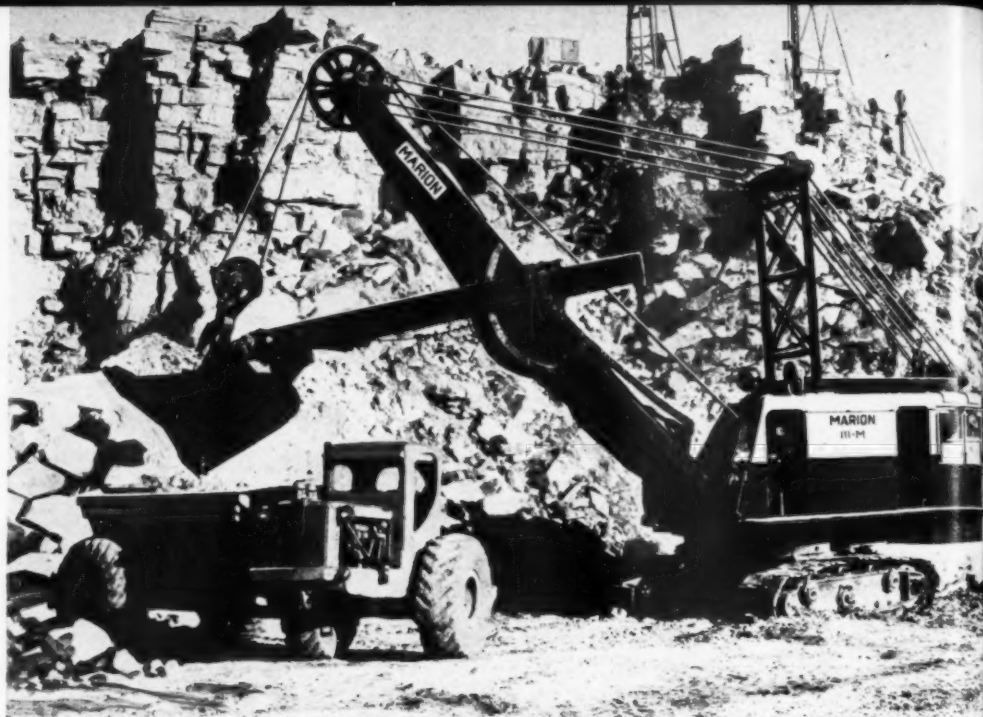
Big Marion shovel (right) utilizes General Motors power unit shown at bottom of page for digging and swinging.



5 hp. Buda diesel adaptable as air compressor drive, hoist engine or emergency use in road construction.

through the use of giant low pressure tires. This method of utilizing wheels instead of the conventional tractor tread has been applied to the Tournadozer, LaTourneau's new bulldozer type machine. It will operate at speeds up to 15 mph. in forward and reverse.

The engine is mounted in the rear thus enabling the operator to have a good view of the blade. Needless to say, diesels are offered as standard equipment with LeTourneau machines. The big



410 hp. Buda supercharged diesel, one of the largest diesels on display.

6 Cylinder, 94 hp. Hercules diesel on display at Road Show (left).

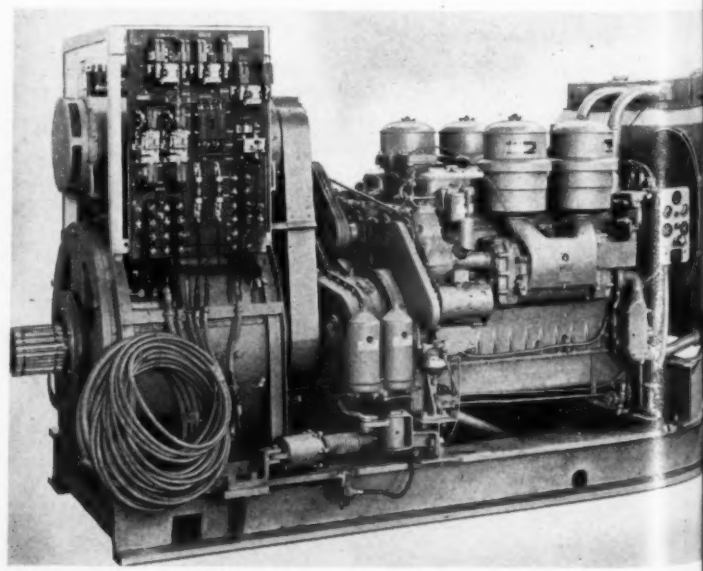
model B Tournadozer—all 25 tons of it—attracted a great deal of interest. This 300 hp. unit has a top speed of 13.6 mph. both forward and reverse and is equipped with a simplified control system utilizing only one control lever. The blade for this machine is electrically operated deriving its power from an A.C. generator built in line with the diesel.

The "steam shovel" is a thing of the past and its offspring, the diesel shovel, is now mature. Marion, Thew, Lorain, Bucyrus-Erie, Lima-Hamilton and Koehring concentrate heavily on diesel prime movers. Marion Power Shovel, especially, has experimented with and developed an effective diesel-electric drive. A power shovel was exhibited at the road show by Marion incorporating this

International UD-24 diesel power unit driving a rock crusher—one of the many applications for diesels in road construction.



General Motors twin diesel generating unit useful in many roadbuilding applications such as powering Marion shovel seen above.

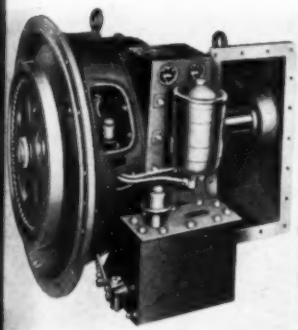


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Twin Disc hydraulic torque converter now being utilized in diesel tractors.



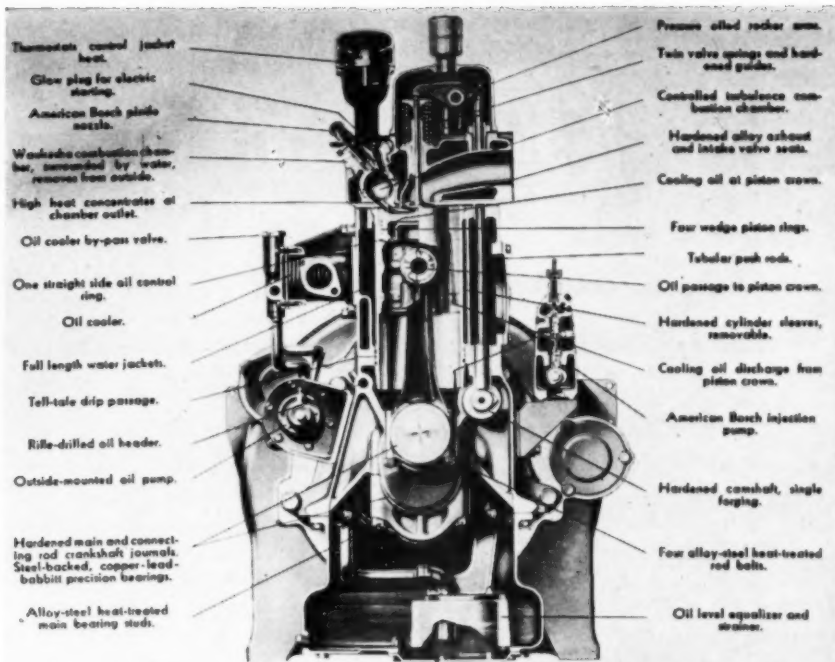
(Below) Rockford power take-off with heavy duty over-center clutch used by many diesel manufacturers.



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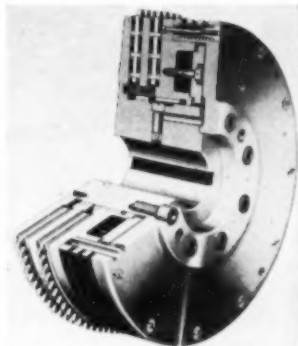
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Cutaway drawing of Waukesha diesel. Much equipment at the show was powered by this make of diesel.

Sectioned view of Twin Disc air-actuated clutch.



(Below) Activated, cutaway version of Cummins NH85-600 diesel was on display.

power set up. It was the 111-M designed for strip mining, quarrying and heavy construction work. For power it utilizes a General Motors Series 71 twin-6 diesel. The development of electric swing in the 111-M is particularly significant in view of its $3\frac{1}{2}$ -4 yard capacity, putting it on the borderline between the clutch and electric type machines, the two general classifications of power excavators. The diesel unit in the 111-M has permitted its use both as a source of power for the clutch-actuated movements of the machine and also to drive a generator needed to power the electric swing unit. Marion also exhibited a $\frac{3}{4}$ yard shovel powered by a diesel engine.

Lima-Hamilton's Shovel and Crane Division had a shovel and a dragline at the Show and both these machines were open for inspection by the visitors. There were many.

Koehring Company, another pioneer in shovel building, offered diesel equipment for most of their extensive line of construction machinery including $2\frac{1}{2}$, $\frac{1}{2}$, $\frac{3}{4}$ and $1\frac{1}{2}$ -yard excavators. In

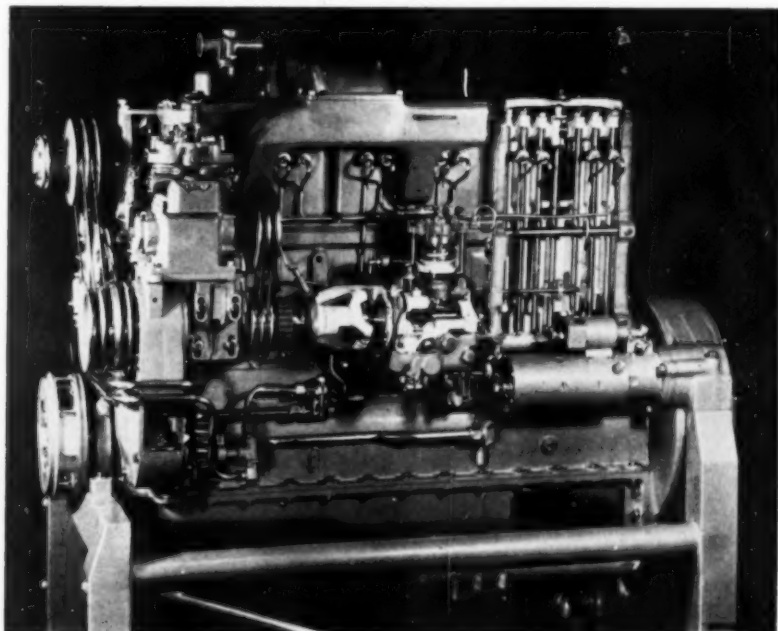
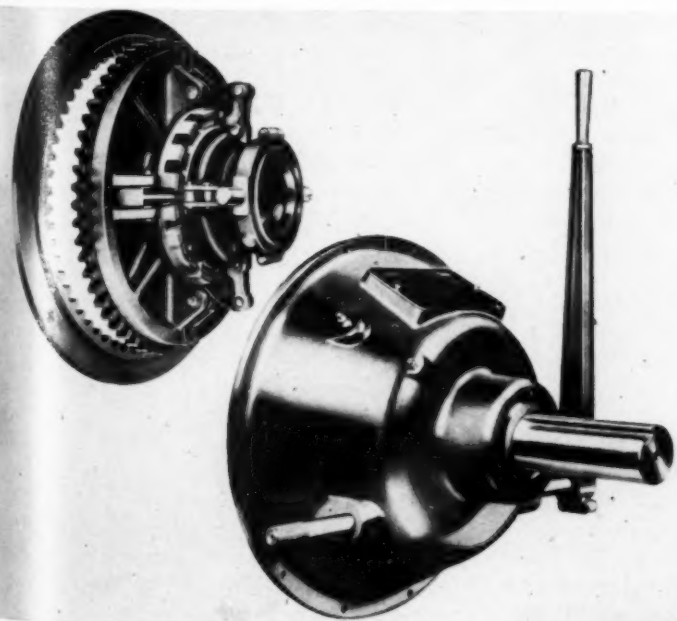
addition Koehring had on display a new rubber tired, off-the-road hauling unit called the Rocktor with a heaped load capacity of 12 cubic yards. It is powered by a 150 hp., 6-cylinder diesel engine.

Mack showed its new model LV, 22 $\frac{1}{2}$ -ton payload capacity end dumper. This monster is powered by a 275 hp. supercharged diesel which drives a huge rear axle. Final reduction is through planetary gears in the hubs. Mack also showed a medium size dumper and the stripped chassis of a four-wheel drive six-wheeler.

Among the displays of larger equipment at the Show were the exhibits of the manufacturers of machinery units so vital to the operation of the heavy roadbuilding equipment. Twin Disc showed its line of power transmission equipment including clutches, power take-offs, and torque converters. Twin Disc with its Hydraulic couplings and torque converters has been able to provide cushioned power for many types of construction units. The air-actuated clutches shown are adaptable to remote control operation. The Fuller Manufacturing

Company showed its new transmission for automotive installation as well as several specialized transmissions. Spicer Manufacturing Division of the Dana Corporation had on exhibit its line of heavy duty transmissions and clutches as well as cut away models of these units to show working parts. Rockford Clutch Company also was represented with an exhibit.

Among the air compressor manufacturers, Worthington and Gardner Denver had popular exhibits. Gardner Denver showed four diesel engine compressors ranging from 105 ft. to 500 ft. capacity. The new Gardner Denver air motor received a great deal of attention. This motor has wide application possibilities in the diesel starting field. Worthington showed its line of portable and semi-portable air compressors which were powered by International and Caterpillar diesels. In short, there is not one segment of the road construction industry which has not felt the powerful impact of diesel. Talk of diesel was widespread among the visitors to this Road Show.



S

Supervising & Operating Engineers Section

CONDUCTED BY R. L. GREGORY

Unit Installation and its effect upon Daily Operation

Part 10.

CONTINUING where the writer left off with this discussion, we will now take up the installation of the generator and final assembly of the unit. In this particular installation, placing of the large generator was quite a problem, in as much as it was delayed by the vendor in shipment, due to conditions beyond his control. The engine proper was completely installed long before the generating unit arrived, so due to lack of space between the new unit and one in operation, considerable juggling and shifting had to be carried on.

The generator rotor and stator were taken off a flat car onto a ramp and brought into the end of the building and between the two units. The rotor was taken in first and followed by the stator. When the rotor was placed on blocking over the generator pit, it was turned at approximately a 45 degree angle, and there was just room enough with about two inches to spare, to bring the stator in behind it.

The stator was then turned at a 45 degree angle and by use of hydraulic and screw jacks, cribbing etc., the stator was placed over the rotor so that the rotor rested approximately in the right position as regarded its center line with that of the stator. A heavy "A" frame was then constructed directly over the unit as a whole and by means of chain falls jacks and some help of the crane, the whole was squared to approximate position and allowed to rest on cribbing in the generator pit. Then by slow but steady procedure the unit was lowered into position, until the unit was in approximate alignment, the rotor coupling with the engine coupling.

Special coupling pins were furnished by the engine manufacturer to help in the alignment of the couplings, the outboard end of the rotor shaft being placed in the outboard bearing, which was at the proper elevation or nearly so. The stator was lowered so that it rested on the sole plates and the work of alignment then carried on. Considerable time was spent in getting an accurate alignment and credit must be given the erector in charge for doing an excellent job, since when the outboard bearing was finally grouted in, along with the sole plates, after his alignment had been checked and rechecked, no difficulty was experienced with bearings or any other misalignment faults, the unit operating perfectly when finally placed in operation.

Both sole plates and outboard bearing were grouted in with "Embeco," the material used in grouting the engine proper. After the unit was properly aligned the coupling bolts were inserted and tightened up and since the sole plates and

outboard bearing were placed on leveling blocks and shims, the unit could be turned with the barring rig, slowly to check the alignment before grouting.

Fuel system: In the plans for the installation of the unit in question one of the main features exploited was to make everything as flexible as possible, not only as it affected the unit to be installed, but also as to the operation of the unit adjoining it. Too many times in planning for additional equipment, in planning the layout the consultant and designer overlook certain features, which if incorporated at the time, add materially to the ease of operation.

The plant had two 100,000 gallon fuel storage tanks located on adjacent land to the plant. These were deemed quite sufficient to handle both the 2250 and the new 3600 units, if properly piped up. While it would have been to the plant's advantage to have additional storage facilities, it was not a necessity, but flexibility of handling the fuel was a necessity. The 2250 unit had a transfer pump, fuel oil purifier, and two day tanks. The new unit was furnished with the same equipment.

The transfer pump on the old unit, pumped the fuel oil from the outside storage tanks (which by the way were equipped with heating coils) through the fuel oil purifier, thence into the day tanks located on a gallery above the operating floor. From these day tanks the fuel flowed by gravity down to the service tank where it was picked up by the fuel pump on the engine and injected into the fuel system. When it came to installing the new transfer pump, fuel oil purifier and additional day tanks, the piping was so arranged, that either transfer pump could pump through either fuel purifier and into any or all of the day tanks, or they could by-pass either or both fuel oil purifiers.

The day tanks were so piped up to the service tanks, that any day tank supply could be switched into either service tank. This was a very handy arrangement, since any tank, pump or fuel oil purifier could be taken out of service at any time for cleaning, repairs, etc., without having to have an outage on either unit. In piping up this system it was carefully planned so that the least number of fittings, valves, turns, etc. could be incorporated, thus lessening friction.

Another feature incorporated in this fuel setup was the installation of a large light fuel oil tank to accommodate No. 3 light fuel for shutting down and starting up. This fuel tank was also placed on the gallery adjacent to the four day tanks. A supply line was installed, running from the base-

ment up to the tank, so that it can be filled from a tank wagon, without any trouble, by connecting the tank wagon hose to this supply pipe. Then the discharge from this light fuel oil tank was connected directly to the fuel line near each engine, so that all the operator is required to do is to open the light fuel valve and close the heavy fuel valve right during operation.

This made the entire system very flexible. Each day tank is equipped with a float switch which controls the pump motors on the transfer pumps in the basement. The operator can start his pump, set his valves and the tanks automatically take care of themselves when full, by shutting down the pumps through these float switches. One step further could have been incorporated. They could have been so arranged as to start up automatically as well as shut off. However we did not feel that this feature should be incorporated, since we felt that we wanted the operator on duty to make periodical inspection of his equipment and if too much automatic equipment is in vogue, the personnel becomes too dependent upon its working and occasionally this leads to disastrous results.

Gauges on the tanks are placed in plain view from the operating floor so that the operator can see his fuel storage in the day tanks at all times. After one has operated a few shifts with this arrangement, care and observation become a routine thing, and no trouble is experienced along this line. So much for the fuel arrangements and the operators have found it a great advantage to be able to work on a pump, clean a fuel oil purifier or day tank without having outage or waiting until an opportunity avails itself for them to keep up this maintenance work.

Lube oil system: Each unit is supplied from a common clean lube oil storage, from which clean lube oil can be put into the crankcase of either engine when operating, or lube oil can be drawn off the crankcase of either engine when operating. Each unit is equipped with its own lube oil purifier. Some engineers and operators have portable lube oil filters as do several plants of the writers acquaintance. In this particular instance the lube oil purifier for the 2250 hp. engine does not have the capacity for the 3600 unit, and since the purifier on the 2250 hp. had been in service for several years prior to the installation of the 3600 hp, it was deemed advisable to have separate stationary filters for each unit.

Each unit is equipped with an auxiliary lube oil pump and strainer, the pump being equipped with an automatic alarm on the signal system in case of failure or trouble.

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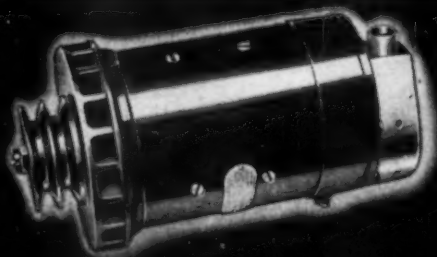
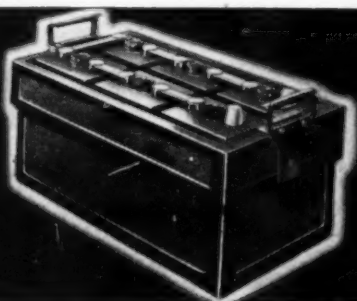
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CONDUCTED BY R. L. GREGORY

Some Suggestions on Injection Equipment from a Marine Diesel Instructor

WE HAVE recently received a letter from Lt. Robert A. Labdon, Chief Instructor in the Division of Diesel Engineering at the U. S. Merchant Marine Academy, Kings Point, N. Y. which contains some helpful suggestions for our maintenance section.

We are more than pleased to receive this letter, since it is the second communication received from a Marine Engineer since the Maintenance section has appeared in DIESEL PROGRESS. This department welcomes suggestions from our Marine readers as well as from those operating stationary plants. We feel that the reason for our getting more material and more questions from those in the stationary field is due to the fact, that the Marine and Navy Divisions have schools of instruction wherein diesel operators and maintenance personnel are taught many of the points which operators and maintenance personnel of stationary and isolated plants have to obtain the hard way, through practical experience.

Now to quote from Lt. Labdon's letter:

"In many cases diesel operators have been forced to operate their engines on very low grades of fuel. We all appreciate the importance of clean fuel around the modern mechanical injection fuel systems, with their many precision parts. Very often the effect of water in the fuel oil is overlooked, but all sorts of attention is given to the wear and tear resulting from solid matter in the fuel.

"It has been my practice to notice the results of water on both types of the smaller pintle nozzles and also the large hole type nozzles with several orifices. On certain throttling pintle nozzles where the valve must lift a fair distance before the orifice is fully exposed, the inside of this extended hole has shown some corrosion, which has been enough to increase the injection rate during the early part of injection to the extent of increasing the fuel accumulated during the delay period and bring about higher peak pressures.

"Where the rate of injection is important, as it is with these throttling pintle nozzles, be sure to watch for water in the fuel. In Marine practice where this type nozzle is often found on emergency units that function only for short periods, condensation often takes place in the fuel tank.

"With hole type nozzles always be sure to check the size of the atomizer holes. Watch for flags when testing the nozzle after cleansing. This is often the result of water erosion effecting the spray angle. In some instances analysis of the fuel oil does not tell the entire story. If the fuel has been carried in several tanks or double bottoms of

ships, the chances of increasing the water content (over the original analysis) are great.

Watch the purifiers closely on the clean discharge side, especially after making changes on the suction to the purifier from another tank.

"Another suggestion I would like to offer is that of taking pressure time cards of combustion and use this in conjunction with a fuel valve lift diagram from mechanically actuated fuel valves. It seems to me, that by sensible control of timing and duration of valve opening of these valves we can maintain proper combustion, pressures, temperatures etc., even though other conditions in the cylinder are not quite normal, namely low compression.

"This of course is done only to counteract a poor condition and when the proper repairs are made, the valve must be set back to its normal position. I have found in Marine practice that an operating engineer can not give too much thought to the above problems. Of course readjusting the fuel system for one cylinder is a risky proposition, but it can get a cylinder back to near normal despite poor rings, leaky valves etc. providing the condition is not too bad. Strictly an emergency measure of course."

We appreciate such suggestions as the foregoing. They not only apply in Marine practice but do apply to stationary units as well. Water and moisture in the fuel is a problem not only on mechanical but air injection units as well and really can play havoc with injection systems. On air injection units where three stage compressors are used, nothing will give quite as much trouble with valves, valve seats and springs as moisture. This also applies to atomizers and fuel nozzles.

As Lt. Labdon says, changing the fuel injection on one cylinder is a rather risky business since it will always reflect back on corresponding cylinders. Efficient operation of any diesel depends upon each cylinder carrying its just share of the unit load, but we can't always have such an ideal condition and it is often necessary to take unorthodox measures in emergencies to keep units running.

Compressor Operation and Maintenance

The subject of compressor operation and maintenance has been discussed in previous articles in this section, but as is the case with other integral parts of a diesel unit, somebody is always running into new situations and conditions, hence this article. We have heard a lot of comment and complaint lately on the fact that valves and valve springs in multistage compressors are not standing up in the manner engineers and operators ex-

pect, especially on the intermediate and high stages.

Our experience for the past few months coincides with others on this matter, not so much on the intermediate stage as on the high stage and we have found out a few things and come to certain conclusions which I present herewith.

1. Materials: It is the opinion of the writer that there is not as much care being taken by manufacturers of certain makes of springs and valves in the matter of uniformity as there was previously. Now, whether this is due to their inability to get the proper materials or whether it is a matter of processing in the manufacture of these items is a question. We have taken a shipment of high pressure springs and had to replace as many as three valve springs within a very few minutes before we finally got one that would stand up and not collapse after a few minutes of operation. The same has also been true of valve conditions but not to such a great extent and often cracked valves or broken valves can be traced back to a defective spring.

2. Valve seats: Probably a lot of this trouble can also be traced back to the maintenance of the valve seats. We know that these seats vary in width from 1/16" to approximately 1/8", the average being about 3/32". Now that isn't a very wide surface for contact with the valve. Many maintenance men do not give enough attention and care to these valve seats to see that they are true, and not pitted. They will take a new valve, give it a few turns on the seat with a lapping compound and think they have a perfect seating valve. However this is not always the case.

These valve seats are generally constructed of cast iron and if you will take a magnifying glass and inspect a valve seat which has been in operation for several weeks, you will invariably find these narrow seats are highly pitted. This pitting may be caused in two ways, either by hard pieces of carbon being pounded into the cast iron by the continually opening and closing of the valves, or by moisture. If you are going to have a satisfactorily operating valve, these seat conditions must be as true and smooth as possibly obtainable.

3. Valve chambers: This links in with the foregoing item. Valve chambers must be kept as free as possible from carbon residue. If carbon is allowed to pile up in the valve chambers, it is absolutely impossible to keep it from passing through the valves and lodge on valve seats. This causes an imperfect seating of the valve and if allowed to operate too long, either the valve breaks or the spring collapses causing trouble and valve leakage.

This discussion to be continued in next issue.

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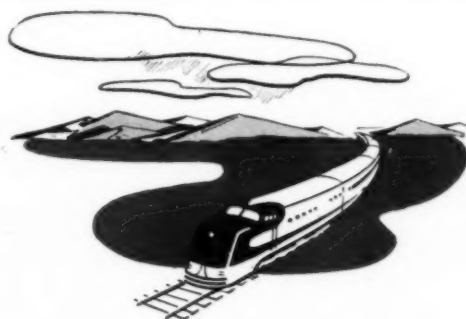
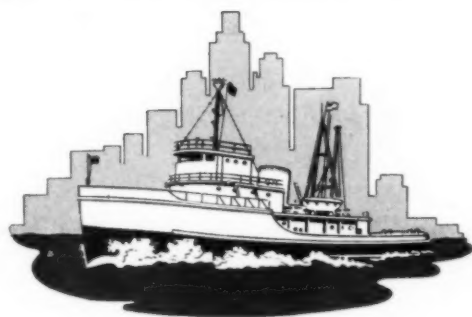
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Diesel Advertising Men Meet with DEMA

ADVERTISING managers and public relations directors of diesel engine manufacturers, met in Chicago recently to discuss topics related to their everyday jobs. It was the third annual session of the group, and, like the two previous meetings, it was arranged by the Diesel Engine Manufacturers Association.

Gordon Lefebvre, President of DEMA, and President and General Manager of Cooper-Bessemer Corp., opened the meeting by outlining the advantages gained by advertising and promotional men getting together occasionally to talk over common aims and problems.

Frank A. Uniack, Director of Public Relations

for the Cleveland Diesel Engine Division, General Motors Corp., L. A. Harlow, Advertising Manager for Fairbanks, Morse & Co., Delbert Kay, Advertising Manager of Nordberg Mfg. Co., A. L. Davis, Manager of the Advertising Department of Worthington Pump & Machinery Corp., Harold D. Ellis, public relations man for DEMA, Dale Cox, Director of Public Relations for International Harvester Co., and Volney B. Fowler, Director of Advertising and Public Relations for Electromotive Division, General Motors Corp., addressed the group.

Sheppard Names Ware As Sales Manager

SPENCER A. WARE, formerly sales manager of

the Original Equipment Division, Fram Corporation, has joined the R. H. Sheppard Company of Hanover, Pennsylvania, as general sales manager. Mr. Ware previously held executive positions with the Chrysler Corporation and Willys-Overland. During the war he was assistant director of the Automotive Division of the War Production Board, and served as a member of the board of directors of the heavy duty truck integration committee.

French Government Honors Nordberg Executives



Commander Poirier congratulates R. E. Friend and R. W. Bayerlein after presentation of honors.

THE important part played by Nordberg Manufacturing Co. in the reconstruction of the French Merchant Marine was officially recognized by the French government recently with the presentation of special honors to two Nordberg executives.

Those honored were Robert E. Friend, President, who was made Officer du Merite Maritime, and Roland W. Bayerlein, Vice President and General Manager of the Heavy Machinery Division who was made Chevalier du Merite Maritime. Over 3,000 employees and guests watched Commander Lucien Poirier make the awards. Commander Poirier is chief of naval material for the French Merchant Marine Mission in the United States and Canada.

Recently completed for the French Merchant Marine by the Tampa Shipbuilding Company, Tampa, Florida, were six modern cargo motor ships, each fitted with six 1,200 hp. Nordberg diesel engines.

New Sinclair Laboratory



Principal buildings for Sinclair Refining Company's new Research and Development Laboratory are rapidly approaching completion on the 38-acre site at Harvey, Illinois, which is being developed by The Austin Company, Engineers and Builders, under a four million dollar contract covering design and construction.

The large, "L"-shaped, three-story Administration Building with simple square entrance tower can be seen on the left, beyond the parking lot, and is directly connected to the "U"-shaped main Laboratory Building by a covered passage at the ground floor level. The tall structure with lofty shafts of ventilating sash in the foreground (just left of center) will house six individual Pilot Plant units, which are separated from each other by corrugated aluminum partitions.

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 - FLORIDA
 - ★ Daytona Beach Boat Works, Inc., Daytona Beach, Fla.
 - ★ J. Frank Knorr, Inc., Miami, Fla.
 - ★ Florida Diesel Engine Sales, Jacksonville, Fla.
 - ★ Correct Craft, Inc., Pinecastle, Fla.
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 - ★ Hubert S. Johnson, Bay Head, N. J.
 - NEW YORK
 - ★ Diesel Marine & Equipment Corp., New York, N. Y.
 - OHIO
 - ★ Ray C. Call Company, Steubenville, Ohio
 - ★ Great Lakes Diesel Company, Cleveland, Ohio
 - OREGON
 - ★ Lee McCuddy's Columbia Marina, Portland, Ore.
 - PENNSYLVANIA
 - ★ Johnson & Towers, Philadelphia, Pa.
 - TEXAS
 - ★ Stewart & Stevenson Services, Inc., Houston, Tex.
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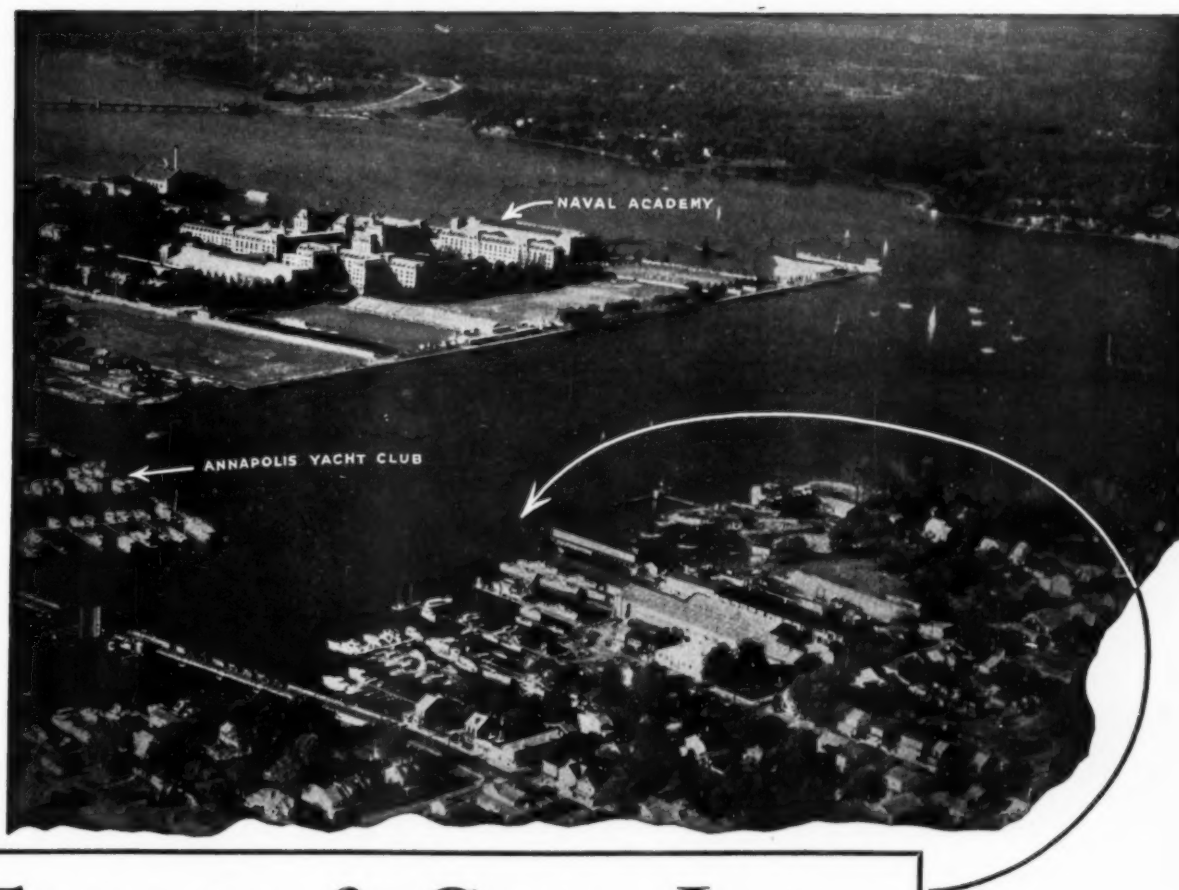
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80 FT. DIESEL
POWERED CRUISER
"SEAPLAY"
BUILT 1948
FOR
**GEORGE W.
CODRINGTON**
CLEVELAND, OHIO



JOHN TRUMPY & SONS, INC.

FORMERLY MATHIS YACHT BUILDING CO.

Annapolis

Maryland

News of the Industry

CENTRIFUGAL PUMPS, with a wide range of capacities and heads have been added to the Bowser line of liquid control equipment for the handling of most liquids.

Single and two-stage units ranging from 1/4 to 75 hp. and from 10 to 2500 gpm.—including self-priming types—are suitable for a variety of applications and for viscosities up to 8000 ssu.

STORAGE BATTERY USERS will be interested in the new 16-page, fully illustrated brochure just published by Gould Storage Battery Corporation. Entitled *Better Batteries For Industry Through Research*, the brochure describes the activities at the Gould Research Laboratory. This

laboratory, located at Depew, New York, is the only complete research laboratory with pilot manufacturing plant where advance design batteries are constantly created—and proved before production.

The brochure features: Raw materials specification and testing, instantaneous voltage measurement, complex metallic compound analysis, crystalline structure of cast lead. This brochure is available by writing the Gould Storage Battery Corporation, Trenton 7, New Jersey.

"**MATERIAL ON THE MOVE**," a 16-mm full color movie with sound, has been released by Caterpillar Tractor Co. to highlight the application of "Caterpillar" scrapers over a full range of earthmoving operations. The film was produced by The Galvin Company, Inc., industrial film pro-

ducers of Kansas City, Mo., with photography by "Caterpillar" cameramen who employed unusual techniques in depicting the operation of heavy machinery and the action pattern of the moving earth.

Copies of "Material on the Move" are available through Caterpillar Tractor Co., Peoria 8, Illinois, or through any of the distributors of "Caterpillar" products.

A **CONTRACT AWARD** for 20 Ioran equipments has just been received from the U. S. Coast Guard by the Sperry Gyroscope Company, Great Neck, N. Y., it was announced recently. It is indicative of the increased peacetime use of this electronic system for determining a ship's geographic position in any weather independently of celestial observations.

The competitive award to Sperry includes a commitment for 24 sets of spares, and follows an order for 40 complete sets of spares purchased by the Coast Guard on March 8. In June, 1947, the Coast Guard purchased 40 Iorans from Sperry, several of which aid weather ships in keeping their stations.



Portuguese Rail Men at Schenectady, N. Y.

SIX REPRESENTATIVES of the Portuguese Railways recently completed a two-week course in the construction, operation and maintenance of diesel-electric locomotives conducted at the huge Schenectady, N. Y., plant of American Locomotive Company. Here they are shown in the operation of actually building a diesel engine as part of their instruction. The Portuguese Railways currently has on order with American Locomotive Company ten 1,000 horsepower diesel-electric road switchers. Completion of these powerful diesel locomotives is scheduled this year.

SECTIONALIZED VERSIONS of modern Twin Disc power transmission units, now standard equipment on most of today's road building machinery, will be on display at the Twin Disc exhibit in Booth 1212 at the Road Show to be held in Chicago's Soldier Field, July 16th to 24th.

Sectioned units on exhibit will include the Twin Disc Model P-214 air-actuated clutch and Model B power take-off. Additional Twin Disc units displayed will include an exploded view of a 14.5 in. hydraulic coupling, the complete line of small hydraulic couplings, Models CL and EH heavy-duty friction clutches, and the hydraulic torque converter.

You get MORE for your POWER DOLLAR

with
BUCKEYE DIESELS

CYLINDER HEAD DESIGN
Unique Buckeye design eliminates valve cages and provides larger valve areas. Unrestricted air flow and quicker expulsion of gases increases combustion efficiency. Heads removable without disturbing exhaust or air intake manifolds.

PISTONS
Nickel chromium, heat-resisting alloy free of very fine texture and exceptional hardness. Mirror finished. Crown designed to prevent heat transfer to piston pin.

BEARINGS
Reversible, shell-type, silver alloy. Manufactured by exclusive Buckeye process. With proper care will last life of engine.

CRANKSHAFT
Solid forging of open hearth steel. Special chemical properties counteract fatigue and crystallization. Extra heavy construction eliminates torsional vibration and critical speeds.

CYLINDER LINERS
Made of close-grained, extra hard nickel chromium alloy, mirror finished. Water-cooled over entire surface. These features more than double liner life.

SILENT WATCHMAN
Cuts off fuel supply at nozzles—immediately stopping engine—if either oil or water supply drops below pressure necessary to serve engine. Exclusive Buckeye feature.

CAMSHAFT
High carbon steel. Hardened valve and injection cams. Fuel injection cams adjustable by degrees.

CONNECTING RODS
Drop forged from single billet of special high carbon, open hearth alloy steel. Precision balanced—rifle drilled. Buckeye method of bearing cap mounting assures positive alignment and rigidity.

150-1440 H.P.
100-1000 KW

Every feature of Buckeye design and construction has been developed to bring the highest standards of dependability and economy to users of Diesel power.

Write today for your Buckeye catalog. Our engineering staff is always at your service. No obligation.



"Be Profit-Wise and Dieselize with Buckeyes"

THE BUCKEYE MACHINE CO.
LIMA OHIO



Engine Builders Since 1908

ELECTRO-MOTIVE DIVISION of the General Motors Corporation recently announced the appointment of George W. Rukgaber as district sales representative in the Chicago Regional Sales office. Mr. Rukgaber was manager of the General Motors Train of Tomorrow from early in 1946 until his transfer to the present appointment. Prior to his connection with the Train of Tomorrow, Mr. Rukgaber had been with General Motors for nineteen years, fifteen years of which was with General Exchange Insurance Corporation and four years with the Corporation's Department of Public Relations.

THE GULF OIL CORPORATION and Koppers Company, Inc., announced the signing of an agreement under which the two companies will engage in cooperative research and development of processes for the conversion of coal to gas and liquid fuels. General Brehon Somervell and Sidney A. Swensrud, Presidents of Koppers and Gulf respectively, made the announcement in a joint statement. Work under the cooperative research program already has started.

THE HERMAN H. STICHT CO., INC. has just developed a new Megohmer Insulation Tester, the Model B-6 "4 in 1" Megohmer. This instrument is called a "4 in 1" Megohmer because it combines four instruments in one as follows: Insulation Tester, Ohmmeter, AC Voltmeter and DC Voltmeter.

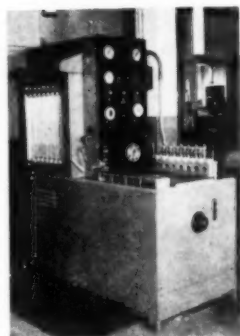
The Model B-6 Megohmer is a non-cranking insulation tester with a steady test potential; source of power are two No. 6 dry cell batteries which are stepped up to 500 volts DC by means of a special vibrator-transformer circuit.

For further information write for Bulletin No. 441 from Herman H. Sticht Co., Inc., 27 Park Place, New York 7, New York.

THE ANNUAL REPORT of the Montreal Locomotive Works states that a substantial order for diesel-electric 1000 hp. switchers has been received from a Canadian road and that the company looks forward to additional diesel-electric orders in 1948 and is prepared to compete aggressively for its share of this new business.

Mr. Fraser revealed that Montreal Locomotive had approximately \$19,000,000 in unfilled orders. This is almost double the backlog of a year ago and includes approximately \$2,000,000 in orders for diesel-electric locomotives, and in this connection, the report commented "In the United States inquiries for diesel locomotives are at a record level and there are practically no inquiries for steam locomotives. A year ago we made plans to meet the Canadian railways growing demand for diesel. Additions to plant and equipment and the rearrangement of existing facilities now permit the production of 1000 hp. diesel-electric switching locomotives. When Canadian and foreign demand justifies additional expenditures, further additions and rearrangements will be made to build diesel-electric locomotives adaptable to all railway operating demands whether mainline, passenger, freight or switching service."

NEW PUMP AND GOVERNOR TEST BENCH



Injection test bench under conditions of varying torque requirements. Complete instrumentation includes electrical tach-

ometer, predetermining automatic reset counter, stroboscope contactor, fuel and oil pressure gauges and fuel temperature gauge.

For further information write Ferrier Engineering, 185 Breckwood Boulevard, Springfield, Massachusetts.

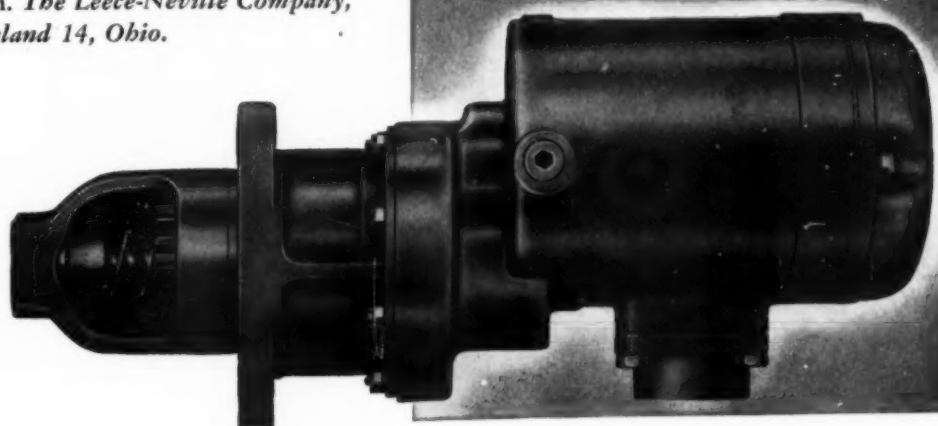
HOW A SIMPLIFIED METHOD of water treatment with a specialized chemical material provides an effective answer to trouble arising from slime formation and lime-scale deposition on coils and other surfaces of evaporative condensers, coolers, humidifying systems and certain types of air conditioning equipment, is described in a new Service Report which has just been released by Oakite Products, Inc. Readers desiring free copies of this new Service Report may obtain them by addressing Oakite Products, Inc., 122D Thames Street, New York 6, N. Y.

Announcing the NEW LEECE-NEVILLE AIR CRANKING MOTOR for Starting Diesel and Gasoline Engines

ADVANCED engineering spells superior performance in this new Leece-Neville Air Cranking Motor which features a motor developed especially for the job by the Chicago Pneumatic Tool Company. Outstanding for its quick, efficient, safe and economical starting of Diesel and gasoline engines! Write today for bulletin which gives performance characteristics, air capacity requirements and other details on its application. *The Leece-Neville Company, Cleveland 14, Ohio.*

INVESTIGATE THESE 6 BIG FEATURES!

- Compact, rotary motor occupies no more space than electric starter—can be installed with same three bolts used for mounting electric starter.
- Built-in automatic oiler assures constant and thorough lubrication of motor.
- No device for trapping moisture required as moisture from air line is used for supplementary lubrication.
- Chrome-plated rotor and liner of motor and bronze end plates for corrosion resistance.
- Exhaust outlet at bottom of motor permits natural drainage of any moisture which may collect in the motor.
- Rotor mounted on precision type ball bearings.



LEECE-NEVILLE
Pioneer and STILL Quality Leader

CRANKING MOTORS • GENERATORS • VOLTAGE REGULATORS • SWITCHES

YOUNG RADIATOR COMPANY is celebrating its 20th year in the field of heat transfer equipment. In a new bulletin, *Twenty Years Young*, the company tells the story of the business from the beginning. In addition to describing the technical advances made by the company, the bulletin pays tribute to the personnel who has made these successes possible.

SOCONY-VACUUM OIL COMPANY, INC. has recently begun construction on an oil pipeline from Portland to Bangor, Maine.

TILLAGE THRIFT is a new publication of the Caterpillar Tractor Company describing the use of diesel tractors in agriculture. Handsomely illustrated, the 16 page booklet describes the many and varied tillage tasks involved in seedbed preparation. Copies of the booklet, Form 11160, may

be obtained from the Caterpillar Tractor Co., Peoria 8, Illinois.

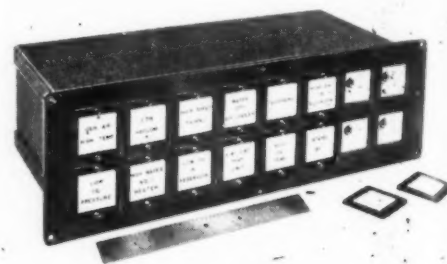
A 650-MILE, 20-INCH crude oil pipeline, the longest built since the war, was officially opened recently. The line, built by Magnolia Pipe Line Company, a Socony-Vacuum affiliate extends from Corsicana, Texas to Patoka. It will supply crude oil through connecting lines to refineries in East Chicago, East St. Louis, and points east.

SPECIFICALLY DESIGNED for heavy-duty operation in industrial plants and public utilities, the new Autocall type "ANG" Annunciator is a unit which may be incorporated in new or existing control panels, actuator boards, racks, or power operator's desks in a minimum of space.

The "ANG" is designed to operate on standard voltages: 24, 48, and 125 volts A.C. or D.C. and

is factory-tested at 1,000 volts A.C. plus two times the rated voltage for one minute to insure reliability in operation.

In operation, the closing of a normally open supervisory or "trouble" contact—in a thermal



Autocall Annunciator

unit to indicate high bearing temperature, for example—closes the control relay of the appropriate Annunciator designation. Closing of this relay causes illumination of the lamp behind the designation and sounding of a remote audible alarm which continues to sound until the signal is acknowledged by momentarily pressing a common silencing switch mounted separately from the Annunciator. Operation of this switch for one acknowledgement however, does not prevent the functioning of the audible alarm in the event of subsequent "trouble" contact closure. For further information on this product write the Autocall Company, Shelby, Ohio.

THE PHILIPS PHYSICAL RESEARCH LABORATORY of Eindhoven, Holland, according to a recent issue of the "Scientific American," has developed a heat engine claimed to better the efficiency of gasoline engines. It is also stated that it has better efficiency than diesel engines except when operating under full load. It is a slow speed engine with a fuel burner in the cylinder head. The burner heats the air directly over the piston causing it to expand thus forcing the piston down. As in all external combustion engines, the air engine must be warmed up before it will start.

E. F. HOUGHTON & CO. recently moved into its new Toronto plant. It will specialize in the manufacture of metal working products such as carburizers, quenching oils, cutting oils and other compounds.

TUBE TURNS, INCORPORATED recently acquired the Pennsylvania Forge Corporation located near Philadelphia, Pa. The firm's forging and machining equipment is modern and very suitable for the production of Tube Turn's flanges and custom forgings.

A NEW PENN ELECTRIC line of magnetic motor starters and contactors in Sizes 0, 1 and 1½ was recently announced by Penn Electric Switch Co. These units are supplied with NEMA Type 1 general purpose enclosures but are also available without enclosure for control panel application.

Complete details, dimension drawings electrical ratings and selection guide for overload relay heaters are given in a new Bulletin 2705 . . . available free upon request to Penn Electric Switch Co., Goshen, Indiana.

CHECK LIST for YOUR POWER REQUIREMENTS BRAND NEW

Diesel Generating Sets from 3 KW thru 325 KW At Low Govt. Surplus Prices

AC

- ☐ 3 KW Witte, single phase, 60 cycles, 120 volts, 850 RPM
- ☐ 5 KW Witte - Hobart, single phase, 60 cycles, 110 volts, 720 RPM
- ☐ 7.5 KW Witte - Hobart, three phase, 60 cycles, 220 volts, 720 RPM
- ☐ 15 KW Hercules DOOC, single phase, 50 cycles, 220/380 volts, 1500 RPM
- ☐ 20 KW Hercules DOOC, single phase, 60 cycles, 220/440 volts, 1800 RPM
- ☐ 20 KW Chrysler, three phase, 50 cycles, 200/380 volts, 1000 RPM
- ☐ 25 KW Chrysler, three phase, 60 cycles, 220/440 volts, 1200 RPM
- ☐ 25 KW Chrysler, three phase, 50 cycles, 220/380 volts, 1500 RPM
- ☐ 30 KW Chrysler, three phase, 50 cycles, 220/440 volts, 1800 RPM
- ☐ 30 KW Hercules DOOC, three phase, 60 cycles, 220/440 volts, 1800 RPM
- ☐ 50 KW General Motors, three phase, 60 cycles, 220/440 volts, 1200 RPM
- ☐ 42 KW General Motors, three phase, 50 cycles, 220/380 volts, 1000 RPM
- ☐ 60 KW General Motors, three phase, 50 cycles, 220/380 volts, 1500 RPM
- ☐ 75 KW General Motors, three phase, 60 cycles, 220/440 volts, 1800 RPM
- ☐ 200 KW General Motors, three phase, 50 cycles, 220/380 volts, 1000 RPM
- ☐ 250 KW General Motors, three phase, 60 cycles, 220/440 volts, 1200 RPM
- ☐ 300 KW Cooper Bessemer, three phase, 60 cycles, 220/440 volts, 900 RPM
- ☐ 300 KW Cooper Bessemer, three phase, 50 cycles, 220/380 volts, 750 RPM
- ☐ 325 KW Cooper Bessemer, three phase, 60 cycles, 220/440 volts, 900 RPM

DC

- ☐ 3 KW Stover, 110 volts, 900 RPM
- ☐ 20 KW General Motors, 110 volts, 1200 RPM
- ☐ 30 KW General Motors, 110 volts, 1200 RPM
- ☐ 125 KW Buckeye, 110/220 volts, 600 RPM
- ☐ 150 KW Buckeye, 110/220 volts, 600 RPM
- ☐ 300 KW Cooper Bessemer, 240 volts, 900 RPM

Just check off the items on which you desire additional information and return this ad attached to your letterhead - -

BENJAMIN'S FOR MOTORS 2090 Mill Avenue, Brooklyn 10, N. Y.

CUNO EN recently ann diesel app Built for ranging to the new filter the Mirro-K element in tions of t units. The valve has signed to al ation thro ridges on e of the unit o full flow thro sides at onc so that cha rupting flow tions have b so that the port or sta changing th For furthe gineering Co

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CUNO ENGINEERING CORPORATION has recently announced a new duplex fuel filter for diesel application.

Built for engines ranging to 2000 hp, the new filter utilizes the Mirro-Klean filter element in combinations of two or four units. The changeover valve has been designed to allow operation through cartridges on either side of the unit or to allow full flow through both sides at once. There is an overlap in the valve so that changeover can be made without interrupting flow of fuel to the engine. Pipe connections have been placed in the center of the unit so that the filter can be mounted on either the port or starboard side of the engine without changing the piping layout.



For further information write to the Cuno Engineering Corporation, Meriden, Conn.

THE BALDWIN LOCOMOTIVE Works has recently received an order from the Minneapolis, Northfield & Southern Railway for five 2000 hp, diesel-electric transfer locomotives having central cab with dual operating controls, two 6-wheeled trucks and a total of six traction motors for extra power at moderate speeds. Orders recently received by Baldwin also include four 1500 hp, diesel-electric road switchers and six 1000 hp, switchers for the St. Louis, Brownsville and Mexico Railway Company, and five 1000 hp, diesel-electric switching locomotives for Missouri Pacific Railroad.

CHARTS SHOWING the characteristics of approved hand fire extinguishers and the comparative effectiveness of approved extinguishers on flammable liquid fires are features of a new catalog recently issued by Ansul Chemical Company, Marinette, Wisconsin.

GENERAL CONTROLS announce the opening of a new and enlarged Denver factory branch office. The new office is located at 1162 Elati Street, Denver 4, Colorado. Mr. M. S. Wilson is branch manager of this office.

J. F. Day, Director of Sales for General Controls Co., has announced the promotion of Mel W. Lewis to Branch Manager of the Cleveland, Ohio factory branch office. Mr. Lewis has been associated with General Controls Co. in San Francisco for the past ten years.

A \$2,500,000 EXPANSION program, recently announced by Brown Instrument Company, Philadelphia, will add more than 60 per cent to its present manufacturing space and a proportionate increase in employment, said Henry F. Dever, president. Increased sales, which have climbed steadily from war peaks, and expanded research and engineering activities, made necessary by the growing industrial use of the type of automatic controls produced by the company, were the main considerations behind the move, he stated.



PIERCE GOVERNORS

-your
answer
to
better
Diesel
performance



PIERCE GOVERNORS get the most from diesel engines. They are simple to install—in either right or left hand mounting. They are simple to adjust—with all controls immediately accessible upon removal of the governor lid. They provide extra rack travel to facilitate starting at low cranking speeds. They offer a simple shut-off device to eliminate much complex linkage often employed in stopping the engine. They provide torque control to increase lugging power. For all of these reasons, Pierce should be your first consideration in diesel engine governing.

THE PIERCE GOVERNOR CO., INC., 1603 Ohio Ave., ANDERSON, IND.

"TITEFLEX" ALL-METAL flexible tubing is illustrated and described in a 24-page catalog recently published by Titeflex, Inc. Included are specifications for standard fittings and illustrations of typical assemblies with these fittings. The new catalog also describes Titeflex bendable pipe, high frequency conductors, and vibration eliminators. For a copy of this bulletin write Titeflex, Inc., 524 Frelinghuysen Ave., Newark 5, N. J.

AMERICAN BRAKE SHOE Company announced recently the appointment of Raymond H. Schaefer as Director of Research and Development. Mr. Schaefer first started with the Brake Shoe Company in 1940 as an Assistant Foundry Metallurgist for the American Manganese Steel

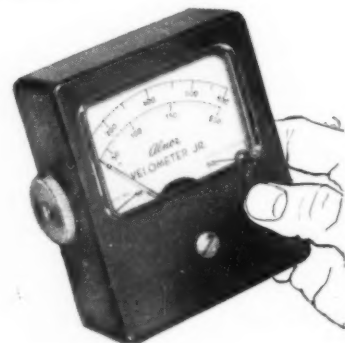
Division. He became Chief Metallurgist in charge of metallurgical research and the company's experimental foundry in 1945.

ANNOUNCEMENT WAS MADE recently from the executive office of Manning, Maxwell & Moore, Inc., of the acquisition of the Hydraulics Division of the Airex Manufacturing Company located in Long Island City. The company will develop industrial applications for Airex Hydraulics products in addition to the present hydraulic line of Airex Relief Valves.

THE HUMBLE OIL and Refining Company has awarded Avondale Marine Ways, Inc., of New Orleans the contract for converting two additional

LSTs for use as mobile power units for drilling marine oil wells off the coast of South Louisiana. This brings to four the number of ships of this type which are being converted at Avondale for Humble.

Alnor Announces Miniature Velometer



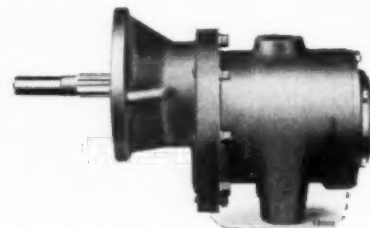
A NEW miniature Alnor Velometer Jr.—recently announced by Illinois Testing Laboratories, Chicago—answers the need for a portable, low-priced, direct reading instrument, giving instantaneous and precise measurement of air velocities in unrestricted areas. Completely self-contained, the Velometer Jr.—4 inches high, 3 inches wide, 1½ inches deep—weighs only 8 ounces and has single or double velocity range scales.

Bulletin 725 has complete information and prices; for a copy, address Illinois Testing Laboratories, Inc., 420 N. LaSalle Street, Chicago 10, Illinois.

HELICOID GAGE DIVISION, American Chain & Cable Company, Inc., announced recently a Standard Test Gage for use with Reid Vapor Test bombs. It may also be used for any service where an accurate, portable test gage is required.

Accuracy of the new Reid Vapor Test Gage is guaranteed to within ½ of 1%. It has the stainless Helicoid precision movement. Dial size is 4½ in. and made of white laminated Phenol.

INGERSOLL-RAND COMPANY is now producing air motors of two sizes as starters for internal combustion engines. The air motor is keyed or splined to the Bendix or starting mechanism and the engine is cranked in the same manner as an automobile engine is turned over when using the electric starter.



The Starting Motors are known as the Size 9BM and Size 20BM; the former having 9 horsepower and the latter 20 horsepower at 90 lbs. per sq. in. air pressure. They are small and compact having an overall length of only 13-3/16 in. and 14½ in.

Additional information may be obtained by writing Ingersoll-Rand Company, 11 Broadway, New York 4, N. Y., or any of its branch offices located throughout the world.

Horsepower for horsepower, rugged Fulton Diesels work at lower speeds with less wear and tear. Long after "racehorse" engines have worn themselves out, many faithful old Fultons are still going strong—with remarkably low operating and maintenance expense.

- Consider total cost per year of service—not first cost alone—before you select a diesel. There's a big difference!
- Type KS (6 or 8 cylinders): 1725 to 4000 HP at 225 to 257 RPM.
- Type BGS (5, 6, 7 or 8 cylinders): 750 to 1980 HP at 257 to 277 RPM.

FULTON DIESELS—the best buy for the long run

FULTON IRON WORKS COMPANY
SAINT LOUIS 14, MISSOURI

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Names in the News

W. L. MELLON, for forty-five years the active head of the Gulf Oil Corporation has retired from his present position as Chairman of the Board. He will continue to serve as a Director. Mr. Mellon is succeeded as Chairman of the Board by J. F. Drake, President of Gulf since 1931.

J. E. Nelson, Gulf Vice President and Treasurer, has been elected Executive Vice President. H. A. Gidney, Vice President and Comptroller, has also been elected an Executive Vice President.

V. H. PETERSON, Manager of the Railroad Division of Fairbanks, Morse & Co., announce recently that Robert Aldag, Jr., who has been a sales

engineer with the company for the past two years, has just been advanced to the position of Manager of the Sales Engineering Department.



R. Aldag

Mr. Aldag is well known in railroad circles. He is a graduate of Purdue University where he specialized in railroad mechanical engineering. In following his college career he started with the Erie Railroad and later joined the Chicago, Burlington & Quincy Railroad Company where for a number of years he supervised operation and maintenance of diesel locomotives. His many friends in the railroad industry will be pleased to hear of his new advancement.

AMERICAN AIR FILTER Co., Inc., has recently announced the appointment of Merle K. Rush as Sales Representative for the Omaha, Nebraska territory. Mr. Rush has become widely known, through years of practical experience, in the air filtration field and is a member of the American Society of Heating and Ventilating Engineers.

ELLIOTT COMPANY announced recently the assignment of A. W. Wood as field engineer in

the Detroit district office. Mr. Wood, a graduate of Massachusetts Institute of Technology (M.S.), recently served as a senior marine engineer in the U. S. Maritime Commission.

Also announced was the assignment of L. B. Rahn as field engineer to the New York district office. A U. S. Navy Commander between 1941-45, Mr. Rahn came with Elliott Company from the Bucyrus-Erie Company. He has an EE degree from Lehigh University.

Look Where Diesel Fuel Oil Is Going

FROM Barron's Weekly of June 14 we learn that one big reason for the shortage of fuel oil is that only 26% of the world's shipping uses coal today, as compared with 47% in 1939. Aside from the Japanese fleet, there now are 13,600 vessels, including steam and diesel, totalling 58.7 million gross tons, burning oil. If we eliminate the laid-up

ships of American registry we still have a total of 12,200 vessels, totalling 49.7 gross tons, consuming oil at the rate of 46,000,000 tons per year. Fuel oil consumption of the world's merchant fleets is 12,000,000 tons more than in 1939 and most of this increase is heavy bunker oil. Barron's quotes the following figures from the British Weekly, "Fanplay."

Type of ship	1939	Number	Gross Tons	Avge. Size	Tons Consumption	
					Per Day	Per Year
Tankers:						
Steam		900	5,400,000	5,900	30	8,600,000
Diesel		800	6,000,000	7,400	12	3,000,000
Dry Cargo:						
Steam		3,300	15,100,000	4,500	20	13,200,000
Diesel		5,100	10,600,000	2,100	10	10,200,000
1948						
Tankers:						
T-2		500	5,000,000	10,000	42	6,800,000
Steam		800	5,100,000	6,400	25	6,400,000
Diesel		750	5,100,000	6,800	12	2,900,000
Dry Cargo:						
Liberty		1,300	9,200,000	7,150	35	8,200,000
Steam		3,200	15,200,000	4,800	20	11,500,000
Diesel		5,650	10,100,000	1,800	10	10,200,000
		12,200	49,700,000			46,000,000

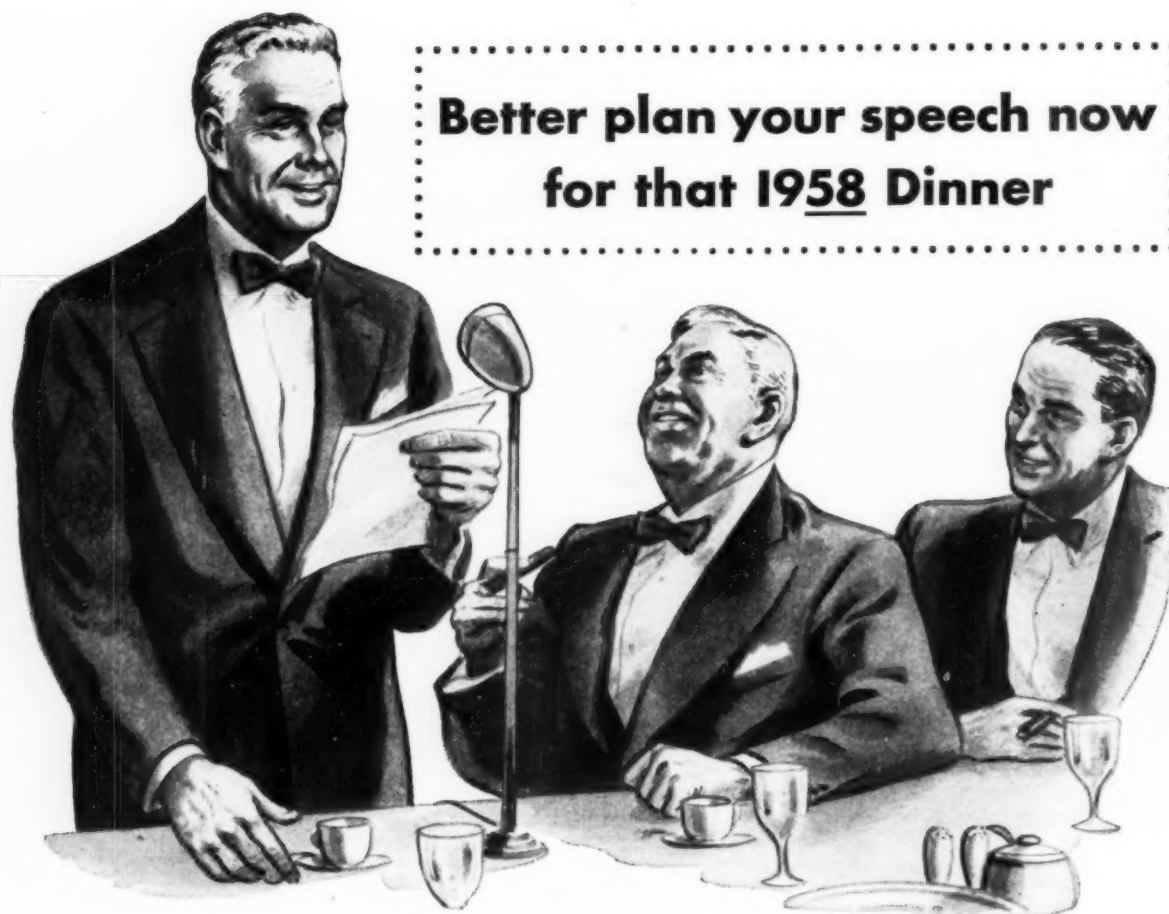
THE MODERN LUBE OIL AND JACKET WATER COOLER—GRAHAM MONOBOLT



A compact and highly efficient cooler recommended for all engine services. Graham Monobolt coolers may be disassembled for cleaning or inspection in a matter of minutes; they

incorporate many other improvements in construction details that result in a top-notch cooler. Deliveries are good and prices are competitive. Ask for leaflet MP-119 for full details.

GRAHAM MANUFACTURING CO., INC. 415 Lexington Ave., New York 17, N.Y.



Better plan your speech now for that 1958 Dinner

Ten years can be a mighty short span in the history of a business. *Yours* for example.

When the time comes to address your fellow executives at the "Annual Banquet" in 1958, will there be a decade of outstanding company progress for you to review?

One way to make sure of a prospering business tomorrow is to make certain *today* that your employees are buying U.S. Security Bonds regularly—on the Payroll Savings Plan. The Payroll Savings Plan is a "look-ahead" plan for both management and employees. It builds up an employee group with a sense of extra security...with a tangible stake in the nation's future...a group bound

to shun dollar-destroying philosophies. At maturity, the Bonds pay \$4 for every \$3 invested.

P. S. P. is paying off *today*, for every Security Bond dollar built up in the Treasury retires a dollar of the national debt that is potentially inflationary. Records of the companies that actively maintain the Payroll Savings Plan show improved employee attitudes. Absenteeism and accidents have dropped as the individual's feeling of security grows with regular Bond buying.

The whole plan of action for use within your company has been mapped out. Just call your Treasury Department's State Director, Savings Bond Division.

The Treasury Department acknowledges with appreciation the publication of this message by

R. W. Tamm

Editor—DIESEL PROGRESS

This is an official U. S. Treasury advertisement prepared under the auspices of the
Treasury Department and the Advertising Council.



Lawrence B. Jackson

ONE of the best beloved, most experienced diesel engineers this country ever produced, a capable and fearless executive in this line, Lawrence B. Jackson, passed away Sunday afternoon, July 4th, at his home in Schenectady, N. Y.



Lawrence B. Jackson

Mr. Jackson was 63 years old, a graduate of Stevens Institute. The most outstanding positions he held during his lifetime were with the Texas Company, Fairbanks, Morse & Co. at Beloit, Wis., and American Locomotive Co., Schenectady, N. Y.

When connected with the Texas Company he was in charge of equipping ocean going tankers with diesel propulsion during the first World War.

In his last position as Director of Engineering with American Locomotive Co., he was responsible for its latest diesel "V" engine now being built in mass production for diesel-electric locomotives.

All of these facts are more or less known to every diesel man in this country from coast to coast. Familiarly known as "Larry," he stood in high esteem of the profession due to his fairness and readiness to help wherever possible, both in an engineering way as well as in personal matters. While he was sick during the past twelve months or so, he received endless letters from all over the country.

We could go on enumerating his successes as an engineer, but his success as an organizer and teacher of men is just as great. Many men now holding executive positions in the diesel industry were developed by his coaxing and training.

American Locomotive Co. had recently retired Mr. Jackson and taken care of him considering the service he had rendered the company. It has only been about a month that this retirement could be enjoyed by him. He passed away suddenly but his memory and his work will stay with us for a long time.

WHY YOU CAN
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These men are looking for air bubbles... they are testing Aero-fin heat transfer coils with air pressure for structural defects.

If there are no bubbles, it means the immersed Aero-fin unit has withstood the terrific strains of steam and hydrostatic pressure tests and is ready to give you long, efficient service.

Your assurance of dependability is Aero-fin's rigid testing... backed up by selected materials and advanced design. Every unit is completely tested.

Another part of the same story of leadership is the accuracy of the famous Aero-fin ratings... good for the life of the unit.

All this effort is to maintain and improve Aero-fin's leadership in the manufacture of high efficiency heat transfer coils for all heating and cooling applications.

- Durability
- Dependability
- Maximum Efficiency

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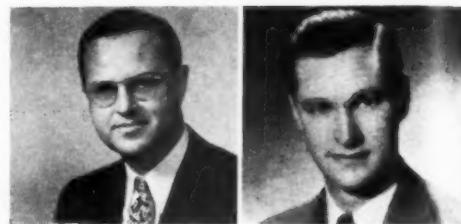
American Locomotive Appointments

FOUR new appointments within the American Locomotive Company have been announced recently by W. E. Corrigan, vice president of sales locomotive division.



J. D. Coleman

C. A. Gandy, Jr.



J. F. Corcoran

P. N. Strobell

John D. Coleman of Schenectady becomes Regional Service Manager for the western region with headquarters in Chicago. Carl A. Gandy, Jr. has been appointed District Sales Representative with headquarters in Atlanta, Georgia. He replaces John F. Corcoran, who has been transferred to the Chicago office to take charge of sales activities for Alco's Railway Steel Spring Division in the Chicago area. Paul N. Strobell is assigned as district engineer for the New York district.

THE WESTON ELECTRICAL INSTRUMENT Corporation has announced the appointment of three new representatives to cover Texas and Oklahoma. This area was formerly served by the T. C. Ruhling Company of Dallas. Mr. Ruhling has retired from business after having served the Weston corporation more than 19 years. The new representatives and their territories are: Butler and Land, 3405 Milton Avenue, Dallas, north Texas; The Lynn Elliott Company, 322 M. & M. Building, Houston, south Texas; Riddle and Hubbell, 302 South Cheyenne Avenue, Tulsa, all of Oklahoma.

New Books

A NEW ILLUSTRATED booklet is now available from Sun Oil Company describing the characteristics and applications of their Sunvis 900 Oil series. In the booklet are shown typical pieces of industrial equipment from large hydraulic presses to textile spindles. Machines such as these which present difficult lubrication problems, require a lubricant like Sunvis 900 Oil. Copies of this booklet are available by writing Sun Oil Company, 1608 Walnut St., Philadelphia 3, Pa.

TWO TRAINING PAMPHLETS, *Trained Men* and *College Graduate Where Now*, have been published by Caterpillar Tractor Co. to acquaint employees and prospective employees with the

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All units can be furnished with either diesel engines or gas, gasoline or butane engines.

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THE NATION'S LARGEST DISTRIBUTORS OF GM DIESEL ENGINES

various training courses available at the Peoria, Illinois plant.

Trained Men points to the four year machinist, foundryman and patternmaker apprentice courses, the two year machine shop, welding, sheet metal and business training courses, the engineering co-operative training course in which trainees alternate study at "Caterpillar" and at an engineering college and the college graduate course.

The college graduate training, shaped into a 50 week period, is outlined at greater length in the *College Graduate Where Now*. Both pamphlets may be obtained by writing the company's training department, Peoria 8, Illinois.

"Railway Preparedness"

A recent booklet published by the Railway Business Association and authored by P. Harvey Middleton, president of that association tells the story of the postwar development of America's railroads. Most interesting was the emphasis placed upon the growing ascendancy of the diesel locomotive.

Diesel locomotives account for the greater part of the billion-odd dollars in orders now outstanding for rail equipment. On May 1, 1948 the railroads (including private car lines) had on order 135,176 new freight cars, and 1,572 new locomotives (including 117 steam and 1,455 diesels). In the first four months of 1948, 31,704 new freight cars and 411 new locomotives (including 5 steam,

4 electric and 402 diesels) were put in service. Nearly every major railroad now has realized the benefits of diesel operation both in freight and passenger service.

The booklet brings this fact out forcefully by listing the new equipment orders for these railroads. Scarcely one has steam power on order.

FAN ENGINEERING, published by the Buffalo Forge Company is now in its fifth edition. This 800-page book is full of valuable information on both theory and practice of fan engineering. It has been termed the "Bible" of the air handling industry. A limited number of copies are available at the manufacturer's cost price of \$6.00. Write Buffalo Forge Company, P.O. Box 985, Buffalo 5, New York.

MARINE DIESEL ENGINE STANDARDS published by the Diesel Engine Manufacturers' Association, \$5.00.

This valuable book, written in the interest of standardized diesel marine practices, for the first time presents an authentic reference manual for the use of marine diesels.

Under fourteen chapter headings, the well-illustrated text covers engine performance, design and construction, application problems, fuel and lubricating oils, cooling and starting systems, air intake and exhaust systems, plus an excellent chapter on propellers and torsional vibration. Twenty-nine charts and diagrams accompany this presentation of the marine diesel.

Copies of the book are available by writing the Diesel Engine Manufacturers' Association, 1 North LaSalle St., Chicago, Illinois.

"CONTROL," new eight page illustrated booklet published by The Pierce Governor Company, Inc., features a technical discussion of governing to obtain the ultimate in engine efficiency and performance. Three types of governing control are covered via: Protection against over speed, constant speed regulation and miles per hour control for automotive installations. Copies of booklet are available from The Pierce Governor Company, Inc., 1512 Ohio Avenue, Anderson, Indiana.



ALLIS-CHALMERS large induction motors of the squirrel cage wound rotor, bracket bearing and pedestal bearing types are described in a new 24-page bulletin released by the company.

The bulletin charts electrical characteristics, representative full load power factors, and approximate range of starting torques of squirrel cage motors larger than 200 hp. A motor selection chart shows approximate range of standard open, 40° C. rise, continuous rated Allis-Chalmers motors with ranges for both bracket and pedestal bearing types. Copies of the bulletin, 05B6132A, are available upon request from Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

The Filters Designed For Engine Engineers



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Widely Accepted By Foremost Engineers

There are no tricky ideas in MICHIANA Oil Filters—they are designed to do the one job of thoroughly absorbing a maximum amount of dirt, grit and other foreign particles to keep the lubricating oil clean. Clean oil is vital to engine efficiency.

Doing this job well means a big saving in oil consumption—it results in a drastic reduction of early and unnecessary wear, eliminating premature replacement or repair of parts.

Cutting Oil Consumption is Vital Now

Oil should be conserved. MICHIANA Oil Filters help do this besides cutting your oil costs—assuring improved performance and adding to engine life. . . . MICHIANA PRODUCTS CORPORATION, Michigan City, Indiana.



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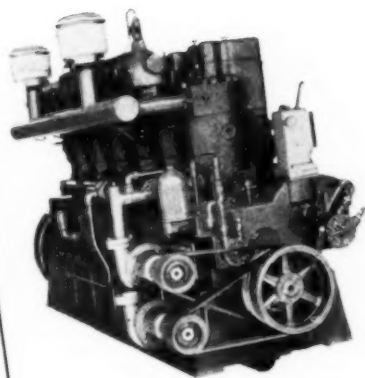
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TUTHILL "Stripped" PUMPS For Your Machinery

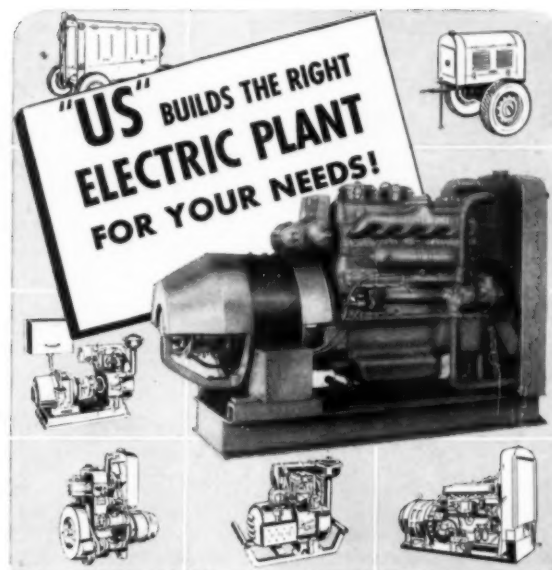


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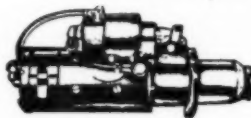
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5227231	No. 80 Injector and Case
5157393	Blower Assembly—Left
5157396	Blower Assembly—Right

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ENGINE PRESSURE INDICATOR

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OF EVERY TYPE OF DIESEL ENGINE

ONE OF THE FEATURES
Responsible for its Overwhelming
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Spring-balance principle assures lastingly dependable service. No field adjustments or settings are required to take care of gauge drifting, or to compensate for other instrument characteristics and engine conditions.

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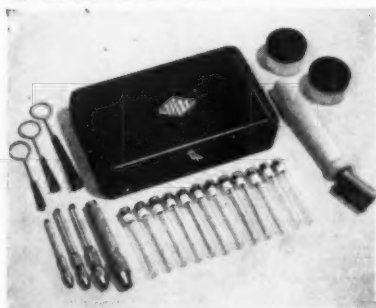
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NEW ADECO NOZZLE SERVICE KIT FOR CLEANING INJECTORS

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4401 N. Ravenswood Avenue
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Manufacturers of dependable Fuel Injection Pumps,
Nozzles and Nozzle Holders for the Diesel Industry.

THE BENEFITS to be gained with the use of specialized cleaning, disinfecting and deodorizing materials in connection with industrial housekeeping and plant sanitation programs, are described in an illustrated 12-page booklet just released by Oakite Products, Inc.

Booklet reports on two, specific materials that are said to perform the cleaning, disinfecting and deodorizing functions easily, efficiently and economically. The first, double-action Oakite Di-Sanite, combines thorough, all-purpose cleaning action with effective deodorizing ability. The second, Oakite Tri-Sanite, a threefold sanitizing agent, contains germicidal and fungistatic properties in addition to its odor-killing and light detergent characteristics, it is reported. Readers wishing free copies of this new booklet may obtain them by addressing Oakite Products, Inc., 122D Thames Street, New York 6, N. Y.

Electromotive at Rail Road Fair

HOW a diesel locomotive operates is portrayed in the exhibit of Electro-Motive Division of General Motors, at the Chicago Railroad Fair, which opened on the Lake Front July 20.

The central feature of the Electro-Motive exhibit was a standard 1500 horsepower General Motors F3 diesel locomotive unit with side panels, some machinery covers and doors eliminated and certain parts of machinery housing cut away to make it possible to see how power flows from the diesel engine through the electric transmission to the driving axles. The result is an exhibit which is somewhat comparable to what would be visible if a 230,000 pound diesel locomotive were sliced in two lengthwise. Capable attendants will be at the exhibit to explain the diesel's workings.

General Motors Licenses Australian Locomotive Concern

THE Clyde Engineering Company of Australia and Electro-Motive Division of General Motors recently completed an agreement under which the Australian company, in collaboration with Electro-Motive, will manufacture diesel locomotives at its works at Granville, New South Wales. The locomotives produced will be utilized on railways in Australasia and certain territories of the Far East.

The arrangements between the two corporations will have other advantages. They permit low price and speedy delivery of major components of the locomotive, a result of the large-scale production carried on by Electro-Motive Division at its two present plants (one in LaGrange, Illinois and the other on the south side of Chicago), soon to be augmented by a third plant at Cleveland, Ohio. Currently Electro-Motive is producing five locomotive units a day and the production schedule is being increased.

Another important point cited is that the agreement makes available to the Australian railways the General Motors 567B diesel engine which GM has developed to its present standard over a period of two decades. The 567B engine is particularly suitable for the special load gauges and axle loads effective on Australian railways.

The hope is that the first locomotives to be manufactured under the joint agreement will be in service during 1950.

The agreement was signed in a ceremony held at the LaGrange plant of Electro-Motive Division, Raymond Purves, as its Chairman and Managing Director, representing the Clyde Company, and C. R. Osborn, Vice President of General Motors and General Manager of Electro-Motive Division,

BURGESS SNUBBERS • BURGESS SNUBBERS

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Snubbers insure quiet without interfering with efficient engine performance. They're designed to eliminate noise by preventing—not muffling—it. The complete line includes both in-line and side-connection types.

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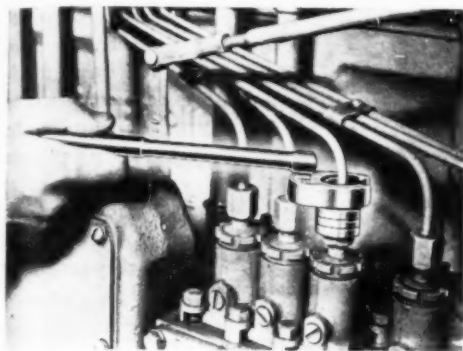
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acting for the corporation. Both men spoke enthusiastically about the arrangement, terming it a further step in future close collaboration between the United States and Australia.

New Open-End Socket Wrench



THE new T.A.C. open end ratchet wrench is designed for use on pipe, tube, conduit, cable, and rod fittings where an ordinary ratchet cannot be used. The ratchet heads operate in a $7\frac{1}{2}^\circ$ arc or less, which makes it ideal for restricted areas.

The T.A.C. tool was originally designed for shipboard use, and is standard equipment on all U. S. Naval vessels, but its time-saving qualities are making it indispensable in the aircraft, automotive, railroad, petroleum, electrical, and other industries.

Descriptive literature is available from the C. J. Hendry Co., 27 Main Street, San Francisco.

Last Minute News

Hercules Publishes "Textbook" On Diesel Engine



AN important contribution to a broader knowledge of the modern, high-speed, heavy-duty diesel engine has just been published by Hercules Motors Corporation. This book is titled, "Hercules Diesel Engines—GENERAL INFORMATION."

Among some of the things discussed in detail are: the fundamentals of diesel power and its advantages; Hercules diesel engine construction with enlightening sectional illustrations; a treatise on the patented Hercules Combustion Chamber and a detailed description of how it functions; the operation of the four cycle engine with functional charts and diagrams; and a discussion of fuel injection equipment and governors.

A copy of this book will be sent to anyone requesting it. Address Hercules Motors Corp., Canton, Ohio.

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Every type of Diesel equipment has its own particular starting problems, and that's why the Bendix* Drive can save you money. Built with fewer parts, the Bendix Drive has a simplified design that results in low-cost operation and maximum adaptability. Here's real starting economy—as proven on over 70 million Bendix Drive installations!

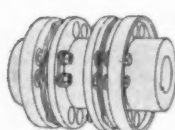
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ECLIPSE MACHINE DIVISION of
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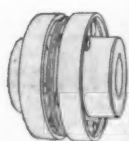
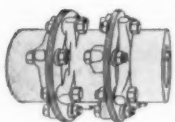


THOMAS Flexible ALL METAL COUPLINGS

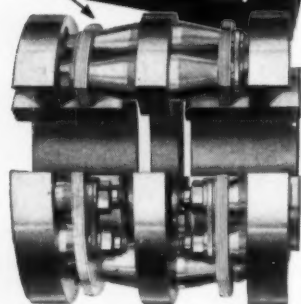
Engineered to stand up on the toughest jobs, Thomas Flexible Couplings do not depend on springs, gears, rubber or grids to drive. All power is transmitted by direct pull.



The standard line of Thomas Couplings meets practically all requirements. But if unusual conditions exist we are equipped to engineer and build special couplings.



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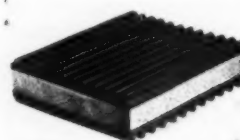
Write for New Engineering Catalog

**THOMAS FLEXIBLE
COUPLING CO.
WARREN, PENNSYLVANIA**

D. E. "DON" SWEENEY has been appointed a Zone Sales Representative for General Motors Series 71 diesel engines and will represent the G.M. diesel factory in seven states: Michigan, Wisconsin, Illinois, Indiana, Kentucky, Ohio and Eastern Missouri.



THE KORFUND CO., Inc., announced recently the availability of new and improved Elasto-Rib, a laminated rubber-cork material for low-cost, effective vibration and noise control.



Elasto-Rib is composed of a layer of cork bonded between two layers of deep-grooved, oil-resistant, synthetic rubber. The ribbed contour of the rubber increases the isolation properties of Elasto-Rib by providing greater deflection and forms a non-skid contact with the floor, frequently eliminating the need for bolting machines to the floor.

Elasto-Rib is now available in 1 in. thick sheets up to 24 in. x 36 in. in size. Recommended loading for the new Elasto-Rib is between 7 and 21 pounds per square inch. For additional details, write for Korfund Catalog ER-700 and free sample. The Korfund Co., Inc., 48-15 32nd Place, Long Island City 1, N. Y.

WOODWARD GOVERNOR COMPANY will hold its twelfth Prime Mover Control Conference September 13 to 17. The company recently conducted a poll to determine the interest in a conference again this year and to decide on the date. The results of the poll more than justified holding the conference again and the date set for this conference reflects the convenience of the majority.

In setting forth the features of the conference, Woodward Governor Company points out that the program is designed to help the individual solve his prime mover control problems and to help him keep abreast of the latest developments in prime mover control. The company further states that while governor instructions, exchange of ideas and information and an understanding of common problems are the basis of the conference, it also welcomes the feeling of friendliness and cordial business relationship which prevails at these meetings.

All expenses of the conference itself are borne by the company, the only cost to those attending being their transportation and personal living expenses during their stay at the conference. Reservation cards may be secured by writing direct to Woodward Governor Company, Rockford, Ill.

Cooper-Bessemer Liberalizes Employee Profit-Sharing Fund

MAJOR improvements in its employee Profit Sharing Retirement Plan were announced by the Cooper-Bessemer Corporation, at Mt. Vernon, O., recently in a meeting attended by shop foremen, union committeemen and officers, office managers and key officials.

New provision of the plan according to James E. Brown, Cooper-Bessemer treasurer, increases employee benefits by providing retirement funds whether they continue to serve the company, or not. The amount earned is held in trust for the employee until retirement age and is then paid on a monthly basis. This provision applies regardless of whether the employee terminates his service through discharge, lay-off, or resignation. Previously, employees shared fully, only if they continued with the company.

WORK HAS COMMENCED on a new \$500,000 American order for 50 diesel buses, reports Mack Manufacturing Corporation. Ordered by the Administracion Municipal de Transportes de Montevideo, these 41-passenger Macks are in addition to the 800 units the company is furnishing the Buenos Aires, Rosario, Cordoba and Mendoza transportation systems, and as in the case of those earlier orders, they will be shipped as complete export units.

F. W. DOHRING, vice president in charge of sales, Elliott Company, announced recently the assignment of the following graduate engineers to district offices, upon their completion of a one-year training course: F. C. Hohenstein, Chicago; M. C. Seeman, Cleveland; G. J. Greaney, Jr., Houston; J. U. Kauffman, St. Louis, Mo.; R. L. Henry, Tulsa; and W. W. Gotherman to Washington, D. C.

REDUCING HATCHERY HAZARDS, a recent publication of Caterpillar Tractor Co. aims at the interests of hatchery owners who have narrowly escaped loss of output due to power shortages. Copies of the booklet may be secured from the offices of Caterpillar Tractor Co., Peoria 8, Illinois, by requesting Form 11692.

SUN OIL COMPANY recently pressed into service two new coastal tankers to expedite increased shipments of gasoline from its Marcus Hook refinery.

The vessels have been renamed the M. S. Mystic Sun and the M. S. Maumee Sun. Each is 220 feet long and has a capacity of approximately 500,000 gallons of gasoline. Powered by 860 horsepower diesel engines, they have a rated speed of about ten knots.

SPEED CONTROL FOR BOILER DRAFT FANS—New 20 page booklet, "Precision Speed Control for Boiler Draft Fans with the Regutron Controlled Magnetic Drive" No. 4400-TEC-1078, discusses principles of operation with graphs, diagrams and installation pictures. Booklet describes how Adjustable Speed Magnetic Drive with Regutron Control provides wide range, smooth, precise, rapid and dependable speed control. Published by Electric Machinery Mfg. Company, Minneapolis 13, Minnesota.

GREAT recently it h locomotives, for passenger expected in Northern's tives.

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GREAT NORTHERN RAILWAY announced recently it has ordered 12 additional diesel-electric locomotives, costing slightly more than \$5,000,000, for passenger and freight trains. Delivery is expected in October. The 12 will bring Great Northern's fleet of diesel-electrics to 157 locomotives.

THE MARLEY COMPANY, INC., recently announced the opening of a new district office in Philadelphia at 1112 Packard Building. Robert M. Sharp is in charge.

DANFORTH K. HEIPLE has been promoted to Chief Field Engineer for R. G. LeTourneau, Inc., according to an announcement by Roy E. McCluskey, Vice President and General Sales Manager for the company. Heiple, in his new duties, will give sales assistance to LeTourneau Distributors in planning equipment applications and compilation of earthmoving production and cost.

THE CROWN INDUSTRIAL Products Company announces a new Electric Panel Type tachometer for providing continuous accurate speed measurements.

The unit consists of a pick up generator with a stationary armature and a small Alnico magnet rotor mounted on sealed ball bearings. There are no brushes or other wearing parts in the generator. A rectifier type meter with a D'Arsonval movement is used. This meter can be furnished in either 3 in. or 7 in. size and is regularly furnished in 0-1250, 0-2500 and 0-5000 rpm. ranges. For further information write Crown Industrial Products Co., 1507 E. 53rd St., Chicago, Illinois.

APPOINTMENT OF THE Earle Equipment Company of Detroit, Michigan, as distributor of General Motors Series 71 diesel engines has been announced by V. C. Genn, General Sales Manager of the Detroit Diesel Engine Division. Founded in 1909 by the late Horatio S. Earle, Michigan's first highway commissioner, the company has continuously served contractors in Michigan for 39 years.

DEARBORN CHEMICAL COMPANY has announced the assignment of F. E. Rolston to the territory previously covered by Tom Holcombe. Mr. Rolston will cover Louisiana, Arkansas and part of eastern Texas. He will be in charge of the sale of all Dearborn products and will be temporarily located at the Shreveport office.

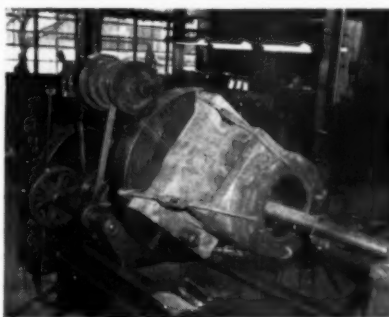
TEXAS GAS TRANSMISSION Corporation recently filed with the Federal Power Commission an application seeking authority to construct an 840-mile pipeline from Texas to Ohio to deliver additional natural gas to its existing Memphis and Kentucky Divisions and to other utility companies serving areas of Kentucky, Ohio and Pennsylvania.

Construction of the new 26-inch pipe line will begin within 60 days after issuance by the FPC of a certificate of convenience and necessity, the company stated in its application. First deliveries of gas at the eastern terminus of the new line (near Middletown, Ohio) can be started in December, 1949, and full contract quantities can be delivered by the Spring of 1950, the application revealed.

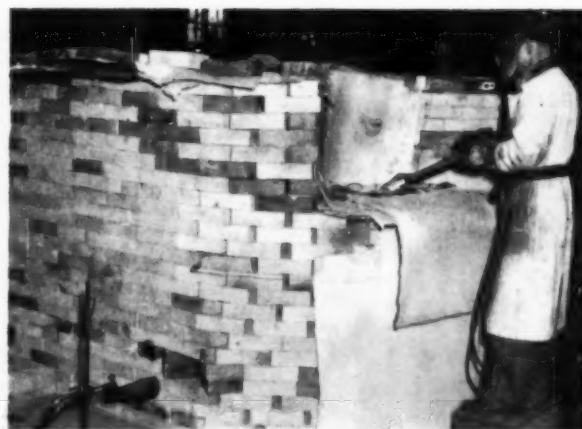
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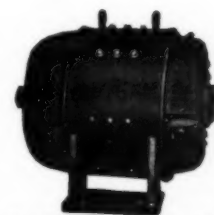
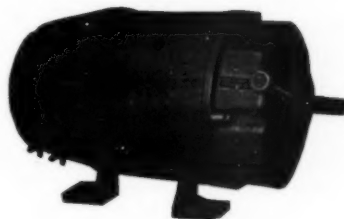
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DC generator (left) two bearings, self-excited type. Can also be furnished with direct connected exciter. Both AC and DC generators can be furnished in the single bearing, flange-mounted type for special mounting requirements. Ball bearing construction is used throughout. Complete data upon request.




Well-known for their rugged design, efficient performance, long life and minimum maintenance, whether powered by electric, gasoline, or Diesel equipment. Backed by over 1/2 century of manufacturing and designing experience, Kurz and Root generators are now serving industries throughout the world

Illustrated are AC generators, only 2 of the many different types developed and designed to fit specific needs and applications, (upper left) two-bearing self-excited type; (lower right) two-bearing direct connected exciter type.

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Write for Literature

POWER PLANT ENGINEERS and designers considering problems of cooling large volumes of water required for steam condensing and similar cooling systems, where natural sources of low cost cooling water are not available, will find a great deal of interest in Binks Bulletin No. 13; copies of this bulletin on the subject of cooling ponds and equipment can be had by writing to the Water Cooling Division of the Binks Mfg. Co., 3114-3140 Carroll Ave., Chicago 12, Ill.

TURCO TRANSPO, a new, nonflammable, noncorrosive, fast acting, long-lived cold tank material for the removal of carbon, sludge, grease and paint is offered by Turco Products. Freer rinsing, Transpo is a two-layer material comprised of a floating chemical seal and a lower layer of potent cleaning agents. Designed to provide peak efficiency at room temperature, there is no need for agitation or heating to maintain its peak the year round. For further details write Turco Products, Inc., 6135 South Central Avenue, Los Angeles, California.

Correction

THE July issue containing the New Bern, N. C., power plant story carried a subhead on page 35 referring to the 100 hp. turbocharged diesels. The reference should have been to the 1400 hp. turbocharged diesels.

West Coast Diesel News

By FRED M. BURT

RECENT DIESEL installations by Smith Boat Works, Newport Beach, Calif.—re-built 6 cyl. Kermath, 125 hp. diesel engines and 2:1 Upson reduction gears in both 46 ft. fishing boat *Marion E*, Sapt. Ralph Eckard, and 53 ft. boat *Union*, Capt. Howard Rue.

WASHINGTON STATE Toll Bridge Authority has commissioned Nickum & Sons, naval architects of Seattle, to prepare plans for six 100 car, four 60 car, steel, diesel-electric, 16 knot speed, ferry boats, costing about \$8,000,000.

WITH A GM DIESEL engine, also a 2½ to 1 Snow & Habstedt reduction gear, purchased from West Coast Engine & Equipment Co., Salvatore Papetti, Collinsville, Calif., has repowered his salmon troller.

WESTHAVEN FARMING CO. for irrigation purposes on its thousands of acres between Bakersfield and Visalia, has purchased 2 twin, 276 hp. General Motors diesel engines, direct connected to pumps from Anderson-O'Brien Co., Los Angeles G-M diesel dealers.

THE NEW BRANCH SALES and engineering office of Twin Disc Clutch Co., at 2950 Leonis Blvd., Los Angeles, brings to eight the number of factory-owned and operated branch offices. John H. Batten, Executive Vice-Pres., with other officials came from Racine, Wis. for the opening. A. E. "Duke" Young, Seattle, is west coast district manager; Pierce Tyrrell, asst. district manager in charge at Los Angeles.

GEORGE CASTERA, President of Bardco Electric Motors, Los Angeles, announces appointment of G. "Bud" Salyers as Sales Manager of that division. Bud was previously plant superintendent in charge of electrical motors production. J. J. O'Donnell has been transferred from engineering as his assistant.

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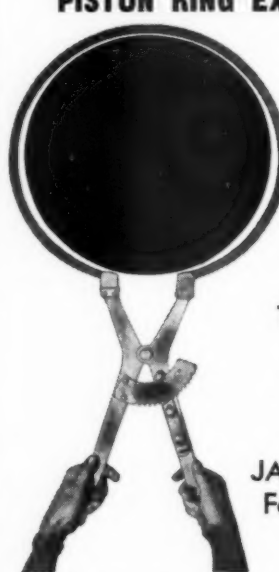
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AT SMITH BOAT WORKS, Newport Beach, Capt. Bill Mann's 46 ft. steel fishing boat *Ranger* was re-powered with a General Motors 165 hp., 6 cyl. diesel engine, new Western 4:1 gear, and a Hallet, 2 cyl. 16 hp. diesel auxiliary.

TWO ALASKA CANNERY barges, *Pavlof* and *Menshikof*, overhauled at Puget Sound yards of Pacific American Fisheries, have been re-powered with Type D-6-M 6 cyl. 100 hp. Lorimer diesel engines.

THE ROSCOE MOSS Company, Los Angeles, has mounted a 4 cyl., 92 hp. General Motors diesel on a highly efficient, new type, water well drilling rig.

ISLEWAYS, LTD. HONOLULU, have taken over Navt ATAs *Ono* and *Ahi* for deep sea towing; the 143 ft. x 33 ft. vessels are each powered with two 1,000 hp. General Motors diesel engines.

SAM YOUNG, founder of The Young Co., San Francisco, and Thomas J. Hall, owner of Hall Engine & Equip. Co., Wilmington, Calif., have merged to form the Hall-Young Co., San Francisco, to specialize in sales and service on Graymarine engines. Hall, with 17 years Gray experience, will move his shop and equipment to San Francisco.

PURCHASED THROUGH Chas. E. Smith, Los Angeles distributor, a 55 hp. Graymarine diesel, weighing 1500 lbs., will power a 32 ft. river work launch, designed for Sims & Co., Pasadena exporters, by Walter C. Howell, for use on San Juan River, Nicaragua.

DESERT MATERIALS CO., Coso Junction, in the Mojave desert, has just installed a "Caterpillar" 75 kw. diesel generating set to provide power for grading and grinding in the pumicite plant; purchased from Shepherd Tractor & Equip. Co., Los Angeles.

FOUR 48 FT. STEEL shrimp trawlers, under construction at National Iron Wks., San Diego, for fishing fleet of Productos Congelados, S.A. Guaymas and Reforma, Mexico, will be powered by 65 hp. Atlas Imperial diesel engines.

THE SAN JOAQUIN Cotton Oil Co., for stand-by power in their plant at Chowchilla, Calif., have installed five 75 kw. Caterpillar diesel generating sets operating in parallel.

AN APC BEING REBUILT by Fulton Shipyards, Antioch, for use as a dragger in Venezuelan waters, will be powered with two 500 hp. GM Cleveland engines and two of the four 30 kw. generators will be powered with GM Detroit diesels.

THE OLD HALIBUT BOAT *Commonwealth*, recently purchased by the Grimes Packing Co., Seattle, from Booth Fisheries, for use as a cannery tender, is being equipped with full mechanical cold refrigeration and a new 125 hp. Atlas diesel engine.

OWNER AND SKIPPER Jim Hodnett, Seattle, is repowering his seiner *Chignik* with a 165 hp. General Motors diesel, purchased from Evans Engine & Equip. Co., Seattle.

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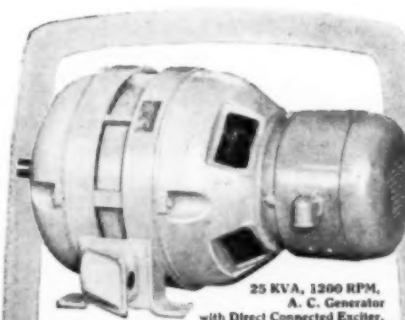
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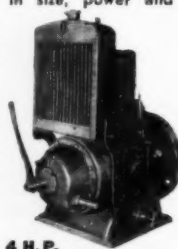
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